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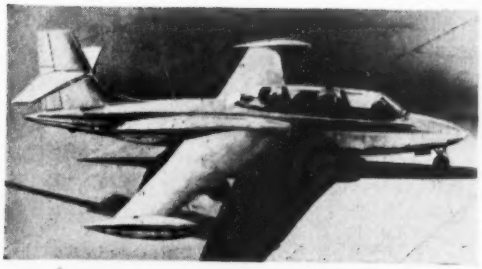

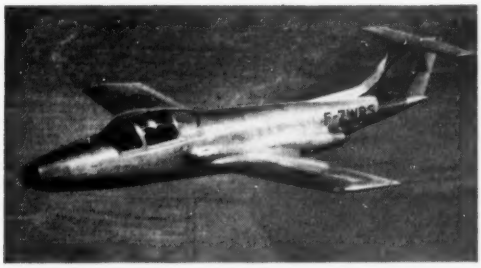

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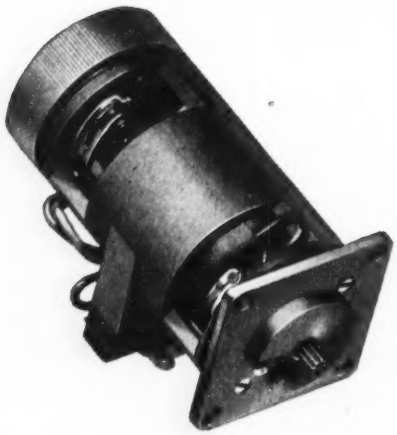

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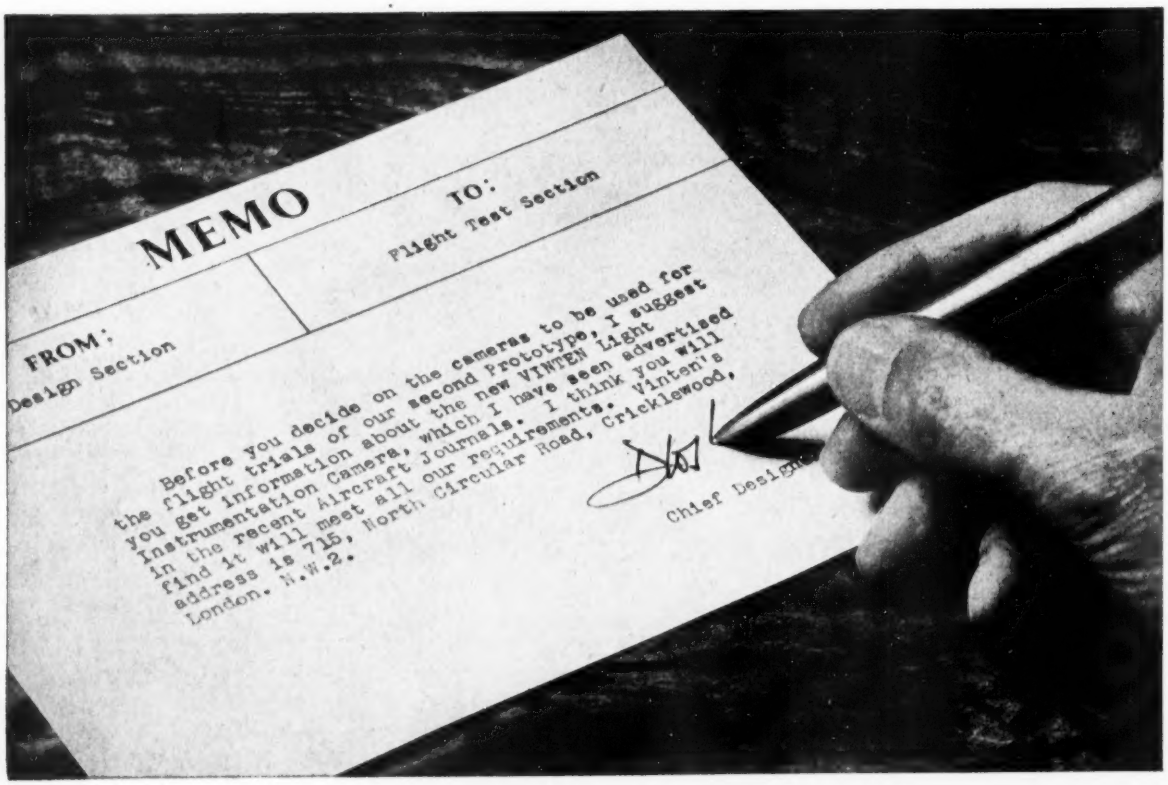
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FROM:
Design Section
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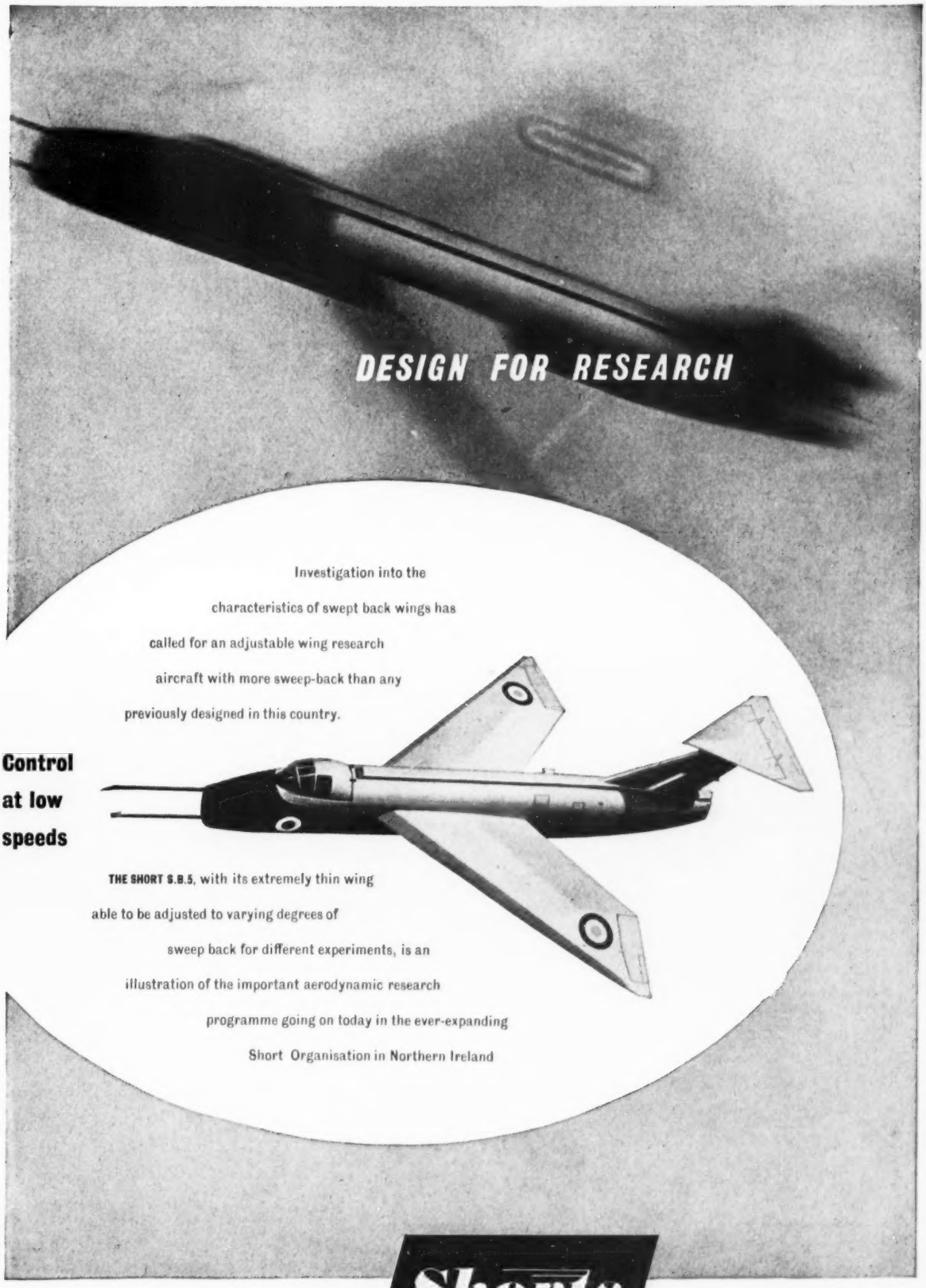
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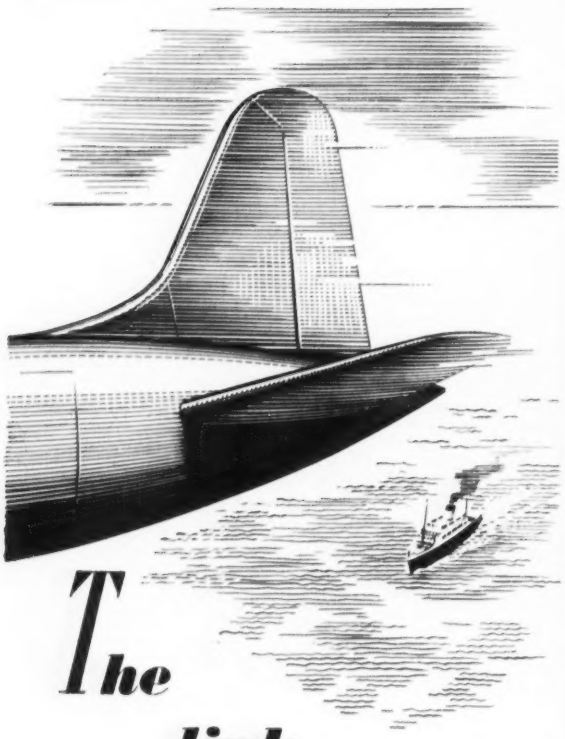

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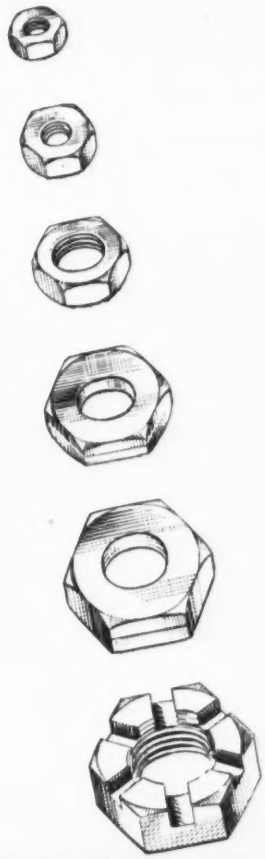

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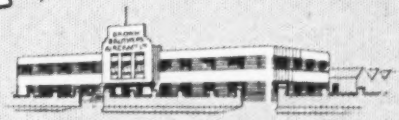

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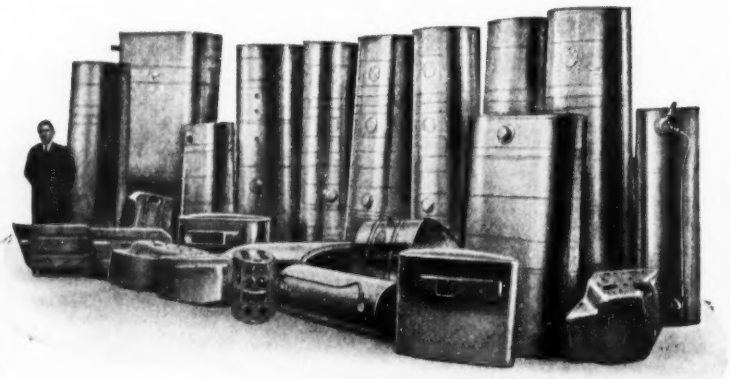

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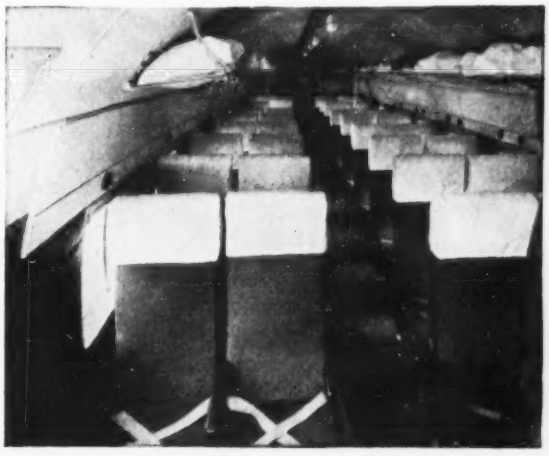

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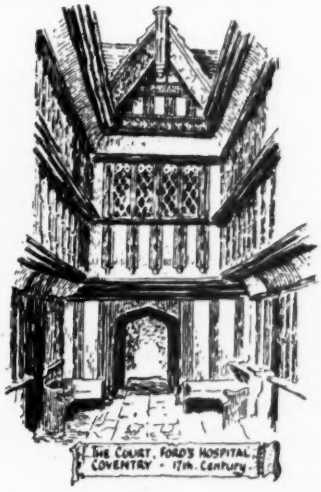

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First Aeronautical Weekly in the World

Founded 1909

No. 2326 Vol. LXIV. FRIDAY, 21 AUGUST, 1953

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IN THIS ISSUE:

Exercise "Momentum" - 216
Beaver 2 in the Air - - 219
Marauder de Luxe - - 222
Gasoline, JP-4 or Kerosine? - - - - - - 224
Everyday Airlift - - - 226
Canberras in Training - 228
Impressions of the Jodel Bébé - - - - - - 231

"Momentum"

STARTING last weekend and continuing in stages through this week and the coming weekend, another military exercise—"Momentum"—is giving practice to Fighter Command, to all branches of defences and to some units of the Fleet Air Arm. As a football team improves its play with regular training and practice, so do the units of the Fighting Services increase their efficiency by this different kind of exercise.

Members of *Flight's* staff have enjoyed the hospitality of a great variety of squadrons and stations at home and abroad while recording their impressions of some dozens of exercises since the war, and "Momentum" finds them once again with squadrons of Bomber and Fighter Commands from home and German bases.

That we are unable to record very much that is new is a matter for regret, for despite the welcome participation of Canberras in more recent exercises, and the increasing use of fighters with contemporary performance, we have been unable to detect much that is novel in the way of tactics and weapons; but there is plenty of promise of such around the corner. It is interesting to surmise what weapons and tactics the Germans might now be using in air exercises had they been in a position to continue uninterrupted over the last eight to ten years their development of missiles and fighters.

Unfair Picture

IT is no accident that party politics is a subject conspicuously absent from this journal; it is our intention that it shall remain so. But to ignore completely the many aviation matters which are connected with, or reflect the influence of, political decisions would be impossible without depriving our readers of important news and information. In addition, when it appears that injustice may be done to the reputation of the aircraft industry through the publication of misleading or false information, then it is our duty to speak up, whether the matter has a political flavour or not.

Our firm conviction that complete nationalization of the aircraft-manufacturing industry would be a most unwise step is, in this instance, incidental. That inaccurate arguments in favour of such a course should be offered to the large and influential ship-building and engineering unions during their recent conference is serious, because the majority of those who heard or read of these opinions lack both the time and facilities to check the accuracy of the information. What is most important is that the engineers should have an appreciation of both the difficulties and the remarkable achievements of the aircraft industry since the war, and an understanding of its situation and direction. Their goodwill is invaluable. According to reports, the information given by the Gloucester delegate at the conference was not calculated to paint a true or balanced picture of the conditions in his area. He called-in irrelevant and (the Gloster company's managing director states) inaccurate reports about Javelin production in Italy, and referred to "large-scale sackings" (the jobs have now been offered back again) as if they were an example of bad management and perversity.

The British aircraft industry today is a unique and enviable mixture of scientific individuality, company enterprise and Government control. It has never been more stable, although international relationships still have an unfortunate influence upon its bread if not upon its butter. Almost everyone knows that many months ago the Government felt compelled to cut back on the production of certain of the more dated current military designs. As a result, with a few others the Gloster company had to face a difficult change-over period of reduced production for some marks of Meteor while preparing for Javelin production to get under way.

At the time of the cut-back on orders, nearly a year ago, Parliament was informed of the temporary unemployment which would result in some sections of the aircraft industry. Nationalization could not have changed the actions taken or the conditions that made them appear necessary. It should be added that thanks to privately negotiated orders for civil and military aircraft, engines, equipment, and even work in quite different fields, companies in the aircraft industry were able to absorb the unexpected blow and lessen its possible effects in the form of short hours and dismissals.

FROM ALL QUARTERS

To Progress Naval Aircraft Supplies

ON several occasions during the past year, usually during debates on defence, Parliamentary criticisms have been voiced concerning the procedure for ordering and developing Naval aircraft. News of a high-level reorganization in the Departments principally concerned does not, therefore, come altogether as a surprise. Its stated object is to secure closer liaison between the Ministry of Supply and the Admiralty.

Rear-Admiral C. John, C.B.

The announcement, made by the Ministry of Supply on August 13th, begins by saying that the Ministry of Supply and the First Lord of the Admiralty, having examined the organization of the two Departments for the design, development and production of Naval aircraft, have decided upon changes. These are then detailed as follows :—

"(1) The Air Warfare Division of the Naval Staff in the Admiralty, which is primarily responsible for the formulation of requirements for naval aircraft and air equipment, is being considerably increased in size.

"(2) The liaison post of Chief Naval Representative in the Ministry of Supply has been abolished. At the same time an additional executive post of Deputy Controller of Supplies (Air) in the Ministry of Supply has been created. The occupant of this post will, under the Controller of Supplies (Air), have executive responsibility for research in relation to naval aircraft, and for their design, development and production. He will, in addition, carry out any other duties outside the Naval sphere which the Controller may delegate to him.

"Rear-Admiral C. John, C.B., who has until now been Chief Naval Representative, has been appointed to this new post.

"In order to provide more effective liaison between the two Departments in this field, the Minister and the First Lord have agreed that the Controller of Supplies (Air) should attend meetings of the Board of Admiralty when aircraft supply matters are under consideration. This will ensure that the Ministry of Supply has the same close contact with the Admiralty as it already possesses with the Air Council."

Rear-Admiral John, who is 50 years of age, was commissioned in the Royal Navy in 1916; he received his promotion to the rank of captain in 1941 and to rear-admiral ten years later. In 1951-52 he was Flag Officer Commanding the 3rd Carrier Squadron. During the years between the wars he was a keen private pilot and competed in the King's Cup Race.

N.Z. Race: Official Arrangements

HIS ROYAL HIGHNESS the Duke of Gloucester will start the England to New Zealand air race on October 8th at London Airport. To allow the fast aircraft to leave England and land in New Zealand in daylight, the start will be at 4.30 p.m. G.M.T. Aircraft will take off at short intervals until 5.15 p.m.

The central area of London Airport has been allocated by the Ministry of Civil Aviation for race purposes and a special committee under Mr. Roger Pugh, O.B.E., has been making the necessary arrangements. Competing aircraft will be on view to the public in this central area from Monday, October 5th till Wednesday, October 7th inclusive, at the normal public-enclosure charges.

On the day of the race the public enclosure in the central area will be open from 11 a.m. onwards, with the following admission charges: pedestrians, 1s; cars (including occupants), 5s; motor cycles (including riders), 2s 6d; cycles (including riders), 1s 6d; double-deck coaches (with occupants), £3 10s; single-deck coaches (with occupants), £2 10s. There will be no advance booking.

The Royal Aero Club racing committee has already held no fewer than 51 meetings in connection with the race. The Club officials for the preliminaries to the start of the race will be Maj. R. H. Mayo, O.B.E., Cdr. A. Goodfellow and Capt. H. S. Broad, M.B.E., A.F.C. (stewards); Col. R. L. Preston, C.B.E. (chief executive); and Mr. F. A. Dismore, D.F.C. (clerk of the course).

A further withdrawal from the Speed Section of the race is the de Havilland Hornet F.3 entered by C. H. Goodlin (U.S.A.). It is also announced that the chief pilot of the DC-3C entered in the transport handicap section by Mrs. Gertrude McKenzie of Australia will be Mrs. Dianna C. Bixby of Bixby Airlines, Long Beach, Calif., U.S.

The routes chosen by pilots of aircraft in the high-speed section are interesting. All the Canberras entered are refuelling in the Cocos Islands in the Pacific and will not touch the Malayan Peninsula, and all plan to complete the distance in five stages. The Valiant is landing only twice, at Karachi and the Cocos Islands. The pilot of the Australian-entered Mosquito has planned only four stages, with stops at Basra, Colombo and Perth. The Australian Mustang may attempt a leg from Basra to Singapore.

Most of the transport handicap entrants so far plan about eight stages, except the Auster Channel Wing CCW-5, the entrant of which gives two alternative routes, one of a mere four stages, including a single leg Colombo to Perth (Western Australia), the other of six stages. Speed will be calculated on total elapsed time.

For the transport handicap section the K.L.M. DC-6A is a hot favourite and rival of the Viscount below. Apart from being a fine aircraft, it should profit from handicap regulations which are very favourable to it.

The Entries from the Antipodes

DETAILS of the R.N.Z.A.F. entry have now been published. The aircraft will be a standard Hastings transport drawn from No. 41 Squadron R.N.Z.A.F. and, besides a comprehensive crew of 27, it will carry a payload of Service equipment; this load is similar to that which would be carried on the normal monthly England to New Zealand courier flight by No. 41 Squadron.

Three flight crews of five men each will share the flying; under the command of W/C. R. F. Watson, A.F.C., they will include four pilots, three navigators, three signallers, three flight engineers and two air quartermasters. A servicing party travelling in the aircraft will be under the command of F/L. J. D. Hurley and will consist of seven N.C.O.s and airmen. In addition, a medical officer and meteorologist, both squadron leaders, and two Press representatives, Mr. William Courtenay, O.B.E., M.M., and Mr. A. Wall, O.B.E., will travel in the Hastings.

No. 41 is the R.N.Z.A.F.'S long-range heavy transport squadron and has built up a fine reputation during transport flights to Japan, in Malaya, in the airlift of No. 14 (Fighter) Squadron to Cyprus last year, and in its normal monthly courier flights to the U.K.

FOR CHRISTCHURCH: On the left is seen the attractively painted B.E.A. Vickers Viscount named "Endeavour" which is being prepared at Wisley for the England to New Zealand Air Race. (Right) Among those discussing the entry and preparations are: Mr. Peter Brookes, B.E.A. (back to camera); Mr. Peter Masefield, B.E.A.'s chief executive; Capt. W. Baillie, B.E.A. ight flcaptain; Mr. E. S. Allwright, deputy chief designer, aircraft, Vickers Armstrongs; and Vickers test pilot Capt. R. Rymer. The B-29 (background) was at one time used for Valiant equipment research.

YOUR FARNBOROUGH SPECIAL

ALWAYS eagerly awaited, the annual "Britain's Aircraft Industry Number" of FLIGHT is to appear on the eve of the S.B.A.C. Show. It will be dated September 4th—a fortnight hence. Constituting a complete review of its subject and therefore a valuable work of reference to be retained during many months to come, it will deal fully with current British aircraft and engines; major equipment will be described; and there will be a directory to hundreds of firms in the "ancillary" industry.

Reproduction of illustrations will benefit from the fact that the major part will be in photogravure; in addition, some photographs will be printed in four colours.

The demand is always heavy, so readers who have no regular subscription are advised immediately to place an order with their newsagent. This issue—the largest single number FLIGHT has ever produced—will be priced at 2s.

The racing aircraft will have only minor modifications and, with stops of 45 min for refuelling and maintenance, should reach Christchurch in a little over two days. It has a range of 3,000 miles and a maximum speed of 325 m.p.h.

An Australian Air Force Canberra completed, on Sunday, a 14,000-mile familiarization trip of the Far East and the South Pacific in 28 hours flying time in preparation for the contest. The pilot was S/L. P. F. Raw, R.A.A.F.

News of the preparations for the race by R.A.F. Canberra crews is given on page 228.

A Westland Appointment

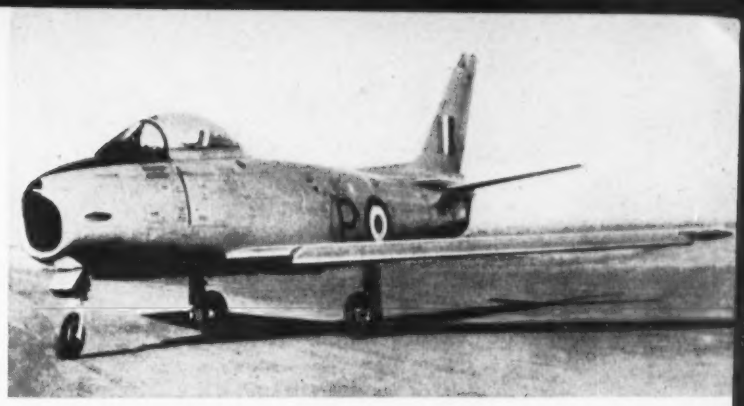
HIS many friends in the aircraft industry will hasten to congratulate Harald Penrose, O.B.E., F.R.Ae.S., A.M.I.N.A., on his new appointment as sales manager of Westland Aircraft Ltd. Mr. Penrose has been Westland's chief test pilot for the past 22 years, but his association with the company goes back as far as 1925 when, as a student taking an aeronautical and engineering course at the London University, he spent a "works period" at Yeovil. He learned to fly at the famous Bristol Flying School, where "Cy" Holmes was his instructor and Cyril Uwins (now managing director of the Aircraft Division of Bristols) was C.F.I. and chief test pilot.

Mr. Harald Penrose.

He first joined Westlands in 1926 and was associated with Capt. G. T. R. Hill in the design and building of the Pterodactyl series of tailless aircraft. In 1928 came his first test flying as a pilot—he had previously been flight observer—on Widgeon and Wessex monoplanes.

His promotion to chief test pilot came in 1931, in succession to Louis Paget, and he made the initial flights on all the Westland types that followed the Wallace. Test pilots do not ordinarily build up vast totals of flying hours, but Penrose has approximately 5,000 hours on 250 types—ranging from rotary-engined biplanes to modern jets.

Harald Penrose is a man of many parts. Whilst his chief interest and hobby has always been flying, he is also a writer of historical stories and an authority on such diverse subjects as sailing, "air archaeology" and bird watching. He has designed no fewer than 36 boats and yachts.



SOFT-FLOWING, SHARP CUTTING: In this first-released picture of the Australian-built North American F-86 Sabre, powered with a Rolls-Royce Avon turbojet, the enlarged intake and one of two gun-ports are in evidence. Thirty-millimetre armament has been mentioned.

A.V-M. W. A. D. Brook

IT was only a week ago, on this page, that we announced the appointment of A.V-M. W. A. D. Brook, C.B., C.B.E., to the post of Vice-Chief of the Air Staff; he was to take up his new duties, with the acting rank of air marshal, at the end of this month. Now, unhappily, we have to record his death, which occurred in an accident to a Meteor 7 which he was flying from Coningsby on Monday. The aircraft struck the ground near Stafford, 20 minutes after take-off.

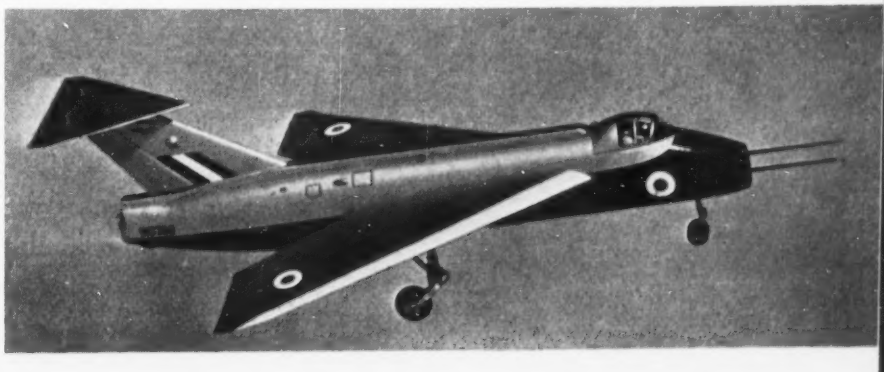
A.V-M. Brook, who was 52 years of age, was commissioned in the R.A.F. in 1921. For two years during the war he was S.A.S.O. at No. 4 Group, Bomber Command, and from August 1944 until the Japanese surrender he was Director of Plans (Air Staff), first at H.Q., Air Command, S.E. Asia, then at Supreme Allied H.Q., S.E. Asia. His post-war appointments were: Director of Policy (Air Staff), Air Ministry; Deputy Chief of Staff at H.Q. Allied Air Forces Central Europe; and (from September 1951) A.O.C. No. 3 Group, Bomber Command.

He leaves a widow and three sons, with whom all who knew him, in the Service and elsewhere, will express deep sympathy.

Tomorrow's Race at Coventry

BAGINTON Airfield, Coventry, is again the venue for the Siddeley Challenge Trophy Race, last of this year's "Nationals." The race will be the main item in the Air Day programme organized by the city's aerodrome committee. After the formal opening by the Lord Mayor at 2.45 p.m., flying will continue until 7 p.m. As reported on page 237, the race will decide the British Air Racing Championship. Entries are:—

No.	Club	Pilot	Aircraft	Reg.
12	Auster F.C.	C. Gregory ...	Taylorcraft plus D	G-AHGZ
15	London A.C.	W. P. I. Fillingham	Hornet Moth ...	G-ADUR
16	Wolverhampton A.C.	L. S. Loveridge ...	Auster 5	G-AIGR
24	Newcastle A.C. ...	A. A. Brough ...	Tiger Moth 2A ...	G-AMLH
32	Liverpool A.C. ...	G. C. Wright ...	Hawk Trainer ...	G-ALOG
35	London A.C.	W. P. Bowles ...	Messenger 2A ...	G-AJYZ
39	Wolverhampton A.C.	D. C. Jemmett ...	Hawk Trainer ...	G-AKPE
41	Vintage A.C. ...	A. W. Bedford ...	Miles Whitney Straight I	G-AEUJ
45	West London A.C. ...	Miss S. M. Leaf ...	Hawk Major ...	G-ACYO
46	Northampton A.C. ...	A. J. Spiller ...	Leopard Moth ...	G-ACMA
73	Southern A.C. ...	A. S. K. Paine ...	Proctor I ...	G-AHNA
74	Hampshire A.C. ...	P. Hillwood ...	Proctor I ...	G-AIEY
77	Brough F.C. ...	G. R. I. Parker ...	Proctor 5 ...	G-AHWR
87	Wolverhampton A.C.	L. Roper	Proctor I ...	G-AHBS
90	Coventry A.C. ...	P. Blamire ...	Gemini IA ...	G-ALZG
94	Lancashire A.C. ...	F. Dunkerley ...	Gemini IA ...	G-AKKB
95	Vintage A.C.	J. Rush ...	Falcon 6 ...	G-AECC
96	Wolverhampton A.C.	R. R. Paine ...	Hawk Speed 6 ...	G-ADGP
98	Elstree F.C.	J. N. Somers ...	Gemini 3A ...	G-AKDC



NEW ANGLE: Having been flown for the past seven months with 50 deg of sweepback on its mainplanes, the Short S.B.5 adjustable-wing research aircraft is now on test, as shown, in the 60 deg configuration. The third phase of development calls for a still further increase—to 69 deg In addition to Mr. T. Brooke-Smith, Short's chief test pilot, Ministry of Supply pilots have flown the machine with 60 deg of sweep.

EXERCISE "MOMENTUM"

First Phase of the Big Defence Test: Air and Ground Impressions

Friendly rivals: Air Marshal Sir Dermot Boyle, A.O.C-in-C. Fighter Command (right), who is directing the defence, and Air Marshal G. H. Mills, A.O.C-in-C. Bomber Command, responsible for the attack.

THE ROYAL AIR FORCE exercise "Momentum," marking the culminating point of the year's training, started at 2100 hr on Friday last, August 14th, and will continue until Sunday evening next. In order that Auxiliary, Reserve and volunteer forces may also participate, the exercise is being held in three phases, two of which cover weekend periods. Each of these periods, from Friday evening until Sunday evening, lasts for 45 hours, and the mid-week period occupied 19 hours last Wednesday.

On the day before the exercise opened, a conference was held at Bentley Priory, the Fighter Command headquarters at Stanmore, Middlesex, at which the A.O.C-in-C. Air Marshal Sir Dermot Boyle was present, together with his "enemy," Air Marshal G. H. Mills, recently appointed A.O.C-in-C. Bomber Command in succession to Sir Hugh Pughe Lloyd, who has retired.

Sir Dermot was insistent that "Momentum" was not a war game in which one side, either the attack or the defence, was to be credited with a win; rather was it a comprehensive exercise of all the air defences of the British Isles including, of course, Bomber Command which, with its potential atomic bomb armament, is now considered to assume a much greater proportion of the defence (by offence) of Britain than was the case in the Battle of Britain. Except for this aspect, these air exercises of 1953 still employ the basic tactics of the famous 1940 battle, though stepped up in speed and complexity.

The Canberras, which hitherto have appeared in exercises only at restricted heights and speeds, are operating realistically and no fighters are being employed to simulate pilotless-aircraft attacks; neither has mention been made of any part assumed to be taken by guided missiles. The Swifts, first seen in quantity at the Royal Review, are not being used.

The problems of the exercise have been set by the School of Land/Air Warfare. It is expected that between 6,000 and 7,000 sorties will have been made during the three phases. Coastal and Flying Training Commands are both contributing aircraft, the latter employing student crews in the last stages of their training.

On the Naval side there is mine-laying in coastal waters by aircraft and attacks on convoys by Westland Wyverns, and Vickers-Armstrongs Supermarine Attackers, used for the first time in the role of strike aircraft.

A.V-M. H. P. Fraser, Senior Air Staff Officer at Fighter Command, on whose shoulders much responsibility falls, was also insistent on the need for the completeness of the exercise.

Speaking at the conference, he emphasized that the air defences of Britain do not consist of just jet fighters and anti-aircraft guns but of a complicated organization made up of major elements, both military and civil, which have to be most carefully integrated to work quickly, effectively, flexibly and smoothly. "The first and foremost requirement in exercising our defence system," he said, "is to bring against it an adequate effort of attack so that it is put under real pressure."

To attain this effort not only are aircraft of Commands stationed in Britain being used but also those of 2nd A.T.A.F. and 4th A.T.A.F. on the Continent. To give Bomber Command greater powers of surprise it has been arranged for aircraft flying from bases in Britain to land on the Continent for refuelling. It is, therefore, impossible for the defence, having noted by radar the departure of a force of Canberras, to be sure that an attack must be made within the operational endurance of those aircraft.

Flying in "Momentum" are about 2,000 aircraft from the R.N., R.A.F., R.Aux.A.F., R.C.A.F. and U.S.A.F., the regular personnel elements being augmented by 8,000 Auxiliary officers and airmen, including those of the Royal Observer Corps. The Naval Minewatching Service is not operating. Very close touch is being kept with the Home Office over the Civil Defence aspect, while some 10,000 of the 35,000 volunteers serving in the Army A.A. Command are on duty.

The first phase, on Friday night, opened with raids by B-26 aircraft of 4th A.T.A.F. in Southern Germany directed against coastal targets—which a number of these aircraft failed to locate. Activity rapidly increased and, between 2100 and 2200 hours, 12 Canberras which had been refuelled on the Continent flew in from bases in Denmark and Northern Germany to make simulated atomic-bomb attacks on airfields in Scotland and East Anglia. Coming in at heights between 40,000ft and 43,000ft, a number of the Canberras were intercepted by Meteor and Vampire night fighters.

Thirty minutes later five separate formations, each of three Canberras approaching from the North Sea, were picked up by radar. The raids were directed against Edinburgh, Hull, Derby, Bristol and Newcastle. Again a proportion was intercepted.

From 2300 to 0230 hr on Saturday morning the raids were made by small groups of Washingtons and Lincolns and, as would be expected, they were in most cases successfully engaged by night fighters. First light on Saturday saw a number of high flying B-45s over the North Sea; they were intercepted by R.A.F. Venoms of 2nd A.T.A.F. operating from Ouston, near Newcastle. At the same time, R.A.F. Meteors and R.C.A.F. Sabres were called upon to intercept some 4th A.T.A.F. Sabres and Thunderjets simulating high-level jet bombers over the Thames estuary.

Later in the morning enemy formations were reported over many parts of the country, and coastal convoys sailing from Portsmouth and Harwich at dawn were given fighter cover by Meteors against attacks by Sea Furies, Attackers and Wyverns of the Fleet Air Arm. The R.A.F. claimed in every case to have intercepted the F.A.A. machines before they could strike.

A further jet-bomber attack developed when single aircraft and small formations were detected at heights varying between 30,000ft and 40,000ft over the Newcastle and Middlesbrough areas. Of these, six interceptions of solo Canberras were made.

Novelty was introduced when a further force of F-84s and F-86s from 4th A.T.A.F. attacked airfields in East Anglia. They came in at between 30,000ft and 40,000ft, coming down to finish the attack by low-level dive bombing.

Men of Kent await a scramble: Against a background of No. 500 squadron markings are, standing, S/L. D. de Villiers (C.O.) and S/L. D. Turner (M.O.). Pilots seated are: P/O. A. Rickard, P/O. R. de V. Rudolph, P/O. D. Croucher, P/O. N. Hutchings, F/O. R. Hoad, F/L. H. Mungham, F/L. G. Moreau, F/L. F. Sumner and P/O. B. Colwell.

During the day Edinburgh was twice attacked and small formations of enemy Sabres crossed the coast at Hastings and proceeded northwards to Hull, passing over London. At 1600 hr A.A. Command reported that the main gun-activity had been in the Bristol, Clyde and Firth areas.

Attacks during Saturday night (August 15th) were again widespread, the early Canberra raids being directed against the dock areas at Portsmouth, Southampton, Tilbury and Cardiff. At 2300 hr intruder B-26s made sorties against airfields in South and East Anglia and at the same time the night fighters were busy handling two medium-sized formations of Lincolns attacking Edinburgh and Glasgow. Thirteen interceptions were claimed.

Between 0100 and 0200 hr Canberras were again used in small formations, this time against targets in the Midlands and on the South Coast. Ten night fighters were despatched to deal with these raids and an unspecified number of interceptions were claimed. Interceptions were also claimed against single Washingtons attacking Bristol, Oxford and Birmingham. A raiding force heading for London was intercepted well out over the North Sea.

The remainder of Sunday's activities followed closely those of the previous day, Sabres and Thunderjets making dive-bombing attacks after high-level approach.

CANBERRAS GET THROUGH

From the Canberras' point of view, "Momentum" was less valuable than some other recent exercises, because their sorties were planned to test fighter and other defences. Even so, it was good experience for the newer crews, and the planning and briefing called for new methods. Some dozen Canberra squadrons were involved, and their task was to keep up a series of thrusts by day and night all over the country. Three machines (to simulate nine) would fly out to the Continent, land to mislead the defences, as already explained, then re-appear at, often, over 40,000ft at the South Coast or Scotland's eastern boundaries.

The particular sortie, on which we flew, involving three Canberras of No. 9 Squadron, was briefed during Sunday morning, and at mid-day we gathered our Mae Wests (or is it Jane Russells these days?), pressure waistcoats and other equipment. Control and signals procedure had been explained concisely. "Face-cream" seemed a particularly appropriate call-sign for a fixer, and even better was "Droppit" for a Canberra bombing force. Amusement was caused when last-minute information came in regarding a Continental airfield to be used. First, the runway QDMs were not reciprocal, and crews wanted to know if the runway was "bent"; then, advice on the dimensions of the *only* runway was followed by further information that work was in process on the *main* runway.

Our take-off time was co-ordinated closely with those of other sorties from other squadrons. The first leg was a pleasant trip to Ahlhorn, not far from Bremen. There we refuelled from efficient-looking German vehicles and took lunch. The previous evening's bad weather had mostly dispersed to the north and east, leaving the North Sea under picturesque puffs of cu, but Ahlhorn was still under heavier cu and layer cloud which reduced visibility and produced a few showers as we map-read our way in at low level. Over the North Sea Canberra crews could also see one or two huge cumulus clouds towering to 40,000ft over the Dutch coast. Warning had been given regarding a jet stream encountered over northern England by Canberras on earlier sorties, but we felt nothing of it. All at Ahlhorn—especially the M.O.—extended ready hospitality to the Canberra crews and passengers, who were for the most part making their first visit to this pleasant 2nd T.A.F. airfield.

On the way over at moderate altitude (for Canberras) we had been warm in ordinary clothes and, in fact, too hot on top under the big transparent cockpit enclosure. For the serious raid on return—an attack on Edinburgh's main railway station from well over 40,000ft—we donned all the correct clothing, including boots, pressure waistcoat, overalls, Mae West and latest-type mask.

The plan, briefly, was to climb to a point 56.00N 06.00E at between 300 and 400 kt and then turn across for the 45-minute run into the Scottish coast at operational height and speed. This we did in the smooth remoteness of the upper levels, and we were not altogether surprised that the three machines were left unmolested for the entire flight. As far as the writer could judge, Fighter Command can do little about a Canberra unless it is purposely brought down 5,000 or 10,000ft. Whether our home radar can be sure of "seeing" a small force of these machines approaching at between 40,000 and 50,000ft was not revealed.

There was just too much cloud over Edinburgh to permit good visual bombing, although it was possible on occasions to see the target area and to single out the nearby Forth bridge. Our "attack" was therefore made blind, the navigator assessing the position and taking a series of photographs with the aid of his "box."

From Edinburgh we went on to Glasgow, then out towards Ireland, and returned once more over a map-like, cloud-free Isle of Man to Blackpool and Manchester before letting down across base out over the sea to the North-East, then back again over Grimsby and straight in. This whole flight, which seemed so precise and effortless, took only about 2¼ hours.

The weather was perfect; we encountered only very slight upper-air turbulence, and we kept strictly to plan without any interference from defences at any time.

M.A.S.

One for No. 615 Squadron: S/L. Sowrey (C.O.) asks F/O. H. Merewether, who has just landed, for particulars of an interception of an F-84 near the French coast.

WITH THE R.AUX.A.F. METEORS

For Phase 1 of Exercise "Momentum" Biggin Hill was manned entirely by Auxiliary squadrons. Nos. 500 (County of Kent), 600 (City of London) and 615 (County of Surrey), all with Meteor Mk 8s, were dispersed on Friday round the southern boundaries of this famous airfield in readiness to take over from the night-fighter forces at first light on Saturday. To put pilots in the picture, extensive briefing had been carried out beforehand and the aircraft also had been carefully prepared. But after the exercise had started on Friday evening pilots of all three squadrons received a final briefing. Latest estimates and forecasts were given and rosters arranged for those who would be available at dawn on Saturday.

Next morning at 0330 hr the ground crews felt their way to the dispersed aircraft and carried out pre-flight maintenance by torchlight. At 0430 pilots attended met. briefing and aircraft were put at ten minutes' notice to scramble. As the sun rose behind scattered grey clouds and the last chill of dawn disappeared the three squadrons were ready for instant action.

All was quiet and no contrails showed in the sky. Time wore on; the sun rose higher, but still no sign of action came. Then, at 0700 hr, the first section scrambled. Four aircraft, heavily loaded, roared off to intercept a raid. Every hour thereafter, and often more frequently, successive sections were scrambled; others landed to refuel, the pilots making their reports and going back to ten minutes' notice.

A variety of "bandits" were sighted and attacked; "trade" was not over-frequent, but when it came it came fast and the hunt was lively. The controllers appeared to be determined to investigate everything and fighters were sent out at all levels to identify and intercept, to attack and to bring back their stories.

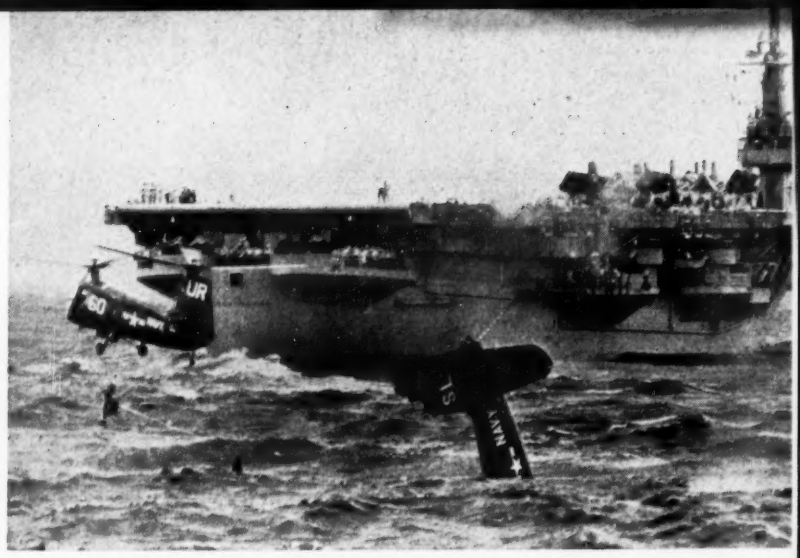
As in real war, the pilot's view of the overall battle was not clear, but a great machine was evidently at work, of which he was the executive arm. The warning, control and co-ordination agencies, disembodied voices on R/T. and telephone, were working hard as a team. It is upon these services, of course, that the responsibility rests for bringing the intercepters into the one vital position for attack, and without them the fighter pilot is virtually blind: standing patrols of the piston-engine era are more and more being replaced by the short guided interception force which must be rapidly and accurately vectored to its target, supplied with all the information it requires, brought in to the attack and then returned to its base.

Nevertheless, the later hours of Saturday saw the Biggin Hill squadrons providing a continuous umbrella over a Naval convoy in the Channel. Hour by hour patrolling sections were relieved over the convoy and the watch continued for air strikes by enemy aircraft. Although there were few attacks this work was perhaps the most difficult of the day because of the difference in speed between convoy and escort—some 250 knots—and because of a "goldfish-bowl" haze which made height and attitude difficult to judge, apart from hiding "bogies" and "bandits" till the last moment.

Altogether, the tempo of operations was not high—certainly not as high as is expected for next weekend, when low-level attackers are awaited—but results so far are encouraging. The defence organization is working smoothly and the ageing Meteor still stands up well to the demands which must now be made of it, perhaps better even than many would be prepared to admit.

C.M.L.

HERE AND THERE



TUG-O'-WAR: Quick work by a Piasecki rescue helicopter resulted in Ensign E. H. Barry being on the hook before his Grumman Guardian could sink in the drink following an engine failure after take-off. A few seconds later his parachute blew open, and a boat finally had to complete the rescue, which had developed into a tug-o'-war.

Fast and Far

THE first Australian-built Canberra landed at Christchurch, New Zealand, last Monday, after flying 3,145 miles from Perth, Western Australia, in 5 hr 42 min. Its crew—who will fly in the London-N.Z. Race—flew it back to Australia the same day—1,520 miles to Melbourne in 3 hr 22 min. World records may be claimed.

Canadian Candour

FRANK comment on the New York Airport authorities' recent refusal to allow an R.C.A.F. Comet to land at any of the city's major civil airports is contained in an editorial in *Canada Review*, a new weekly paper published in this country. The article dismisses the "noise-abatement" explanation and concludes: "Nice people, these Americans, but jealous—and with cause. Somebody has something better. Canada and Great Britain have reason to be proud."

R.N.Z.A.F. Queen's Flight

WITHIN the next two months the R.N.Z.A.F. will form a Queen's Flight at Ohakea, north of Wellington, N.Z., to man the two Dakotas in which the Queen and the Duke of Edinburgh will fly during their tour next winter. Ten aircrew, including five pilots, three navigators and two signallers, have been selected. Several of them, incidentally, will be members of the crew of the R.N.Z.A.F. Hastings which will compete in the England to New Zealand Race.

Coventry Gas-turbine Lecture

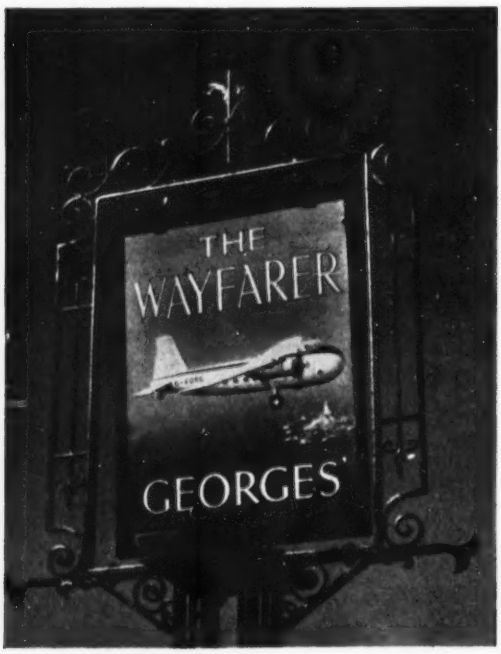
AT a public lecture to be held by the City of Coventry Freemen's Guild, Mr. W. H. Lindsey, M.A., F.R.Ae.S., director and chief engineer of Armstrong Siddeley Motors, Ltd., is to speak on the development of the company's aircraft gas turbines. The meeting will take place at 8 p.m. on Thursday, September 24th.

African Pilots at A.S.T.

FIVE potential pilots for West African Airways Corporation—three from Nigeria and two from the Gold Coast—have arrived in this country to train for their commercial licences. Their initial instruction will be given by Air Service Training, Ltd., at Hamble, under scholarships awarded by the West African Governments; further training will be given by W.A.A.C. on their return to Africa.

Better Late . . .

THE U.S. Air Force has only now disclosed that the first non-stop jet flight across the Pacific was made as long ago as July 29th, 1952, by an RB-45 Tornado. It was commanded by Major Louis Carrington, who was accompanied by a co-pilot and a navigator. Carrington now receives the Mackay Trophy, a silver cup given annually to a member or members of the U.S. Air Force for the most meritorious flight of the year. The Tornado flew 3,460 miles via the Great Circle route from Elmendorf A.F.B., Alaska, to Yokota A.F.B., Japan. The flight took 9 hr 50 min and the aircraft was refuelled twice in flight by a B-29 tanker.



SIGN OF THE TIMES: A prefabricated public house designed by a brewery's architect and erected in three months carries this pleasing name and sign. It will serve a new housing estate near Bristol's Filton airfield.

Believe It or Not

A B-17G which in 1945 was shot down in flames into the Zugersee, near Karlsruhe, has been salvaged and is now a travelling exhibit in Switzerland. All equipment was still aboard, tyres still inflated and petrol in the tanks.

Perring Scholarship Winner

THE award of the Perring Scholarship for the two-year course which begins in October at the College of Aeronautics, has been made to Mr. A. Coull, of Peterhead. Mr. Coull was educated at Peterhead Academy and graduated at Aberdeen University, where he obtained first class honours in Civil Engineering.

Helicopter Dinner

THE Helicopter Association of Great Britain is to hold its annual dinner at the Dorchester Hotel, London, on Friday, September 11th. Distinguished guests, it is hoped, will include Rear-Admiral Caspar John, appointed (as related on p. 214) to the new post of Deputy Controller of Supplies (Air), M.O.S.; Maj. Gen. G. S. Thompson, Director of Land/Air Warfare, War Office; and A.V-M. T. N. McEvoy, who is shortly to be Royal Air Force Instructor at the Imperial Defence College.

Royal Review Souvenir

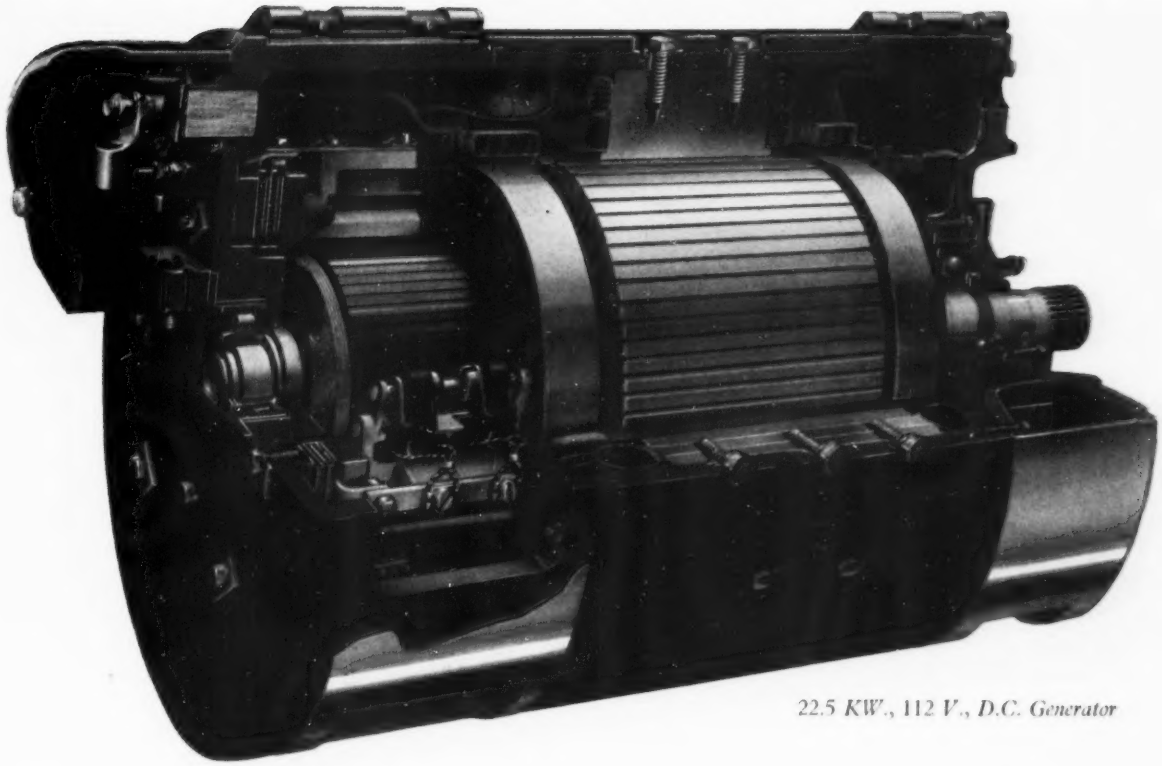
COPIES of the illustrated souvenir programme for the recent Coronation Review of the R.A.F. are now available from the Royal Air Force Benevolent Fund. The programme includes over 30 official photographs of all types of aircraft at present in service, an identification chart, and an article outlining the day-to-day activities of R.A.F. Commands at home. The programmes, at the reduced price of 1s 6d, post free, may be obtained from the R.A.F. Benevolent Fund, 67 Portland Place, London, W.1.

Parachute Article Amendments

TWO amendments to Maj. T. W. Willans' parachuting article, "This Way Out" (published last week) are due as a result of typographical errors. The statement that "a freely falling human body making an attempt to remain in a face-down attitude will, after reaching terminal velocity, probably turn on its back and spin . . ." should have read "making *no* attempt." Figures quoted for parachute-opening heights in the world championships in Yugoslavia should have read "between approximately 150 and 1,600ft, as against an estimated opening height of 1,000ft . . ."

The Electrical Aspect . . .

of aircraft generators



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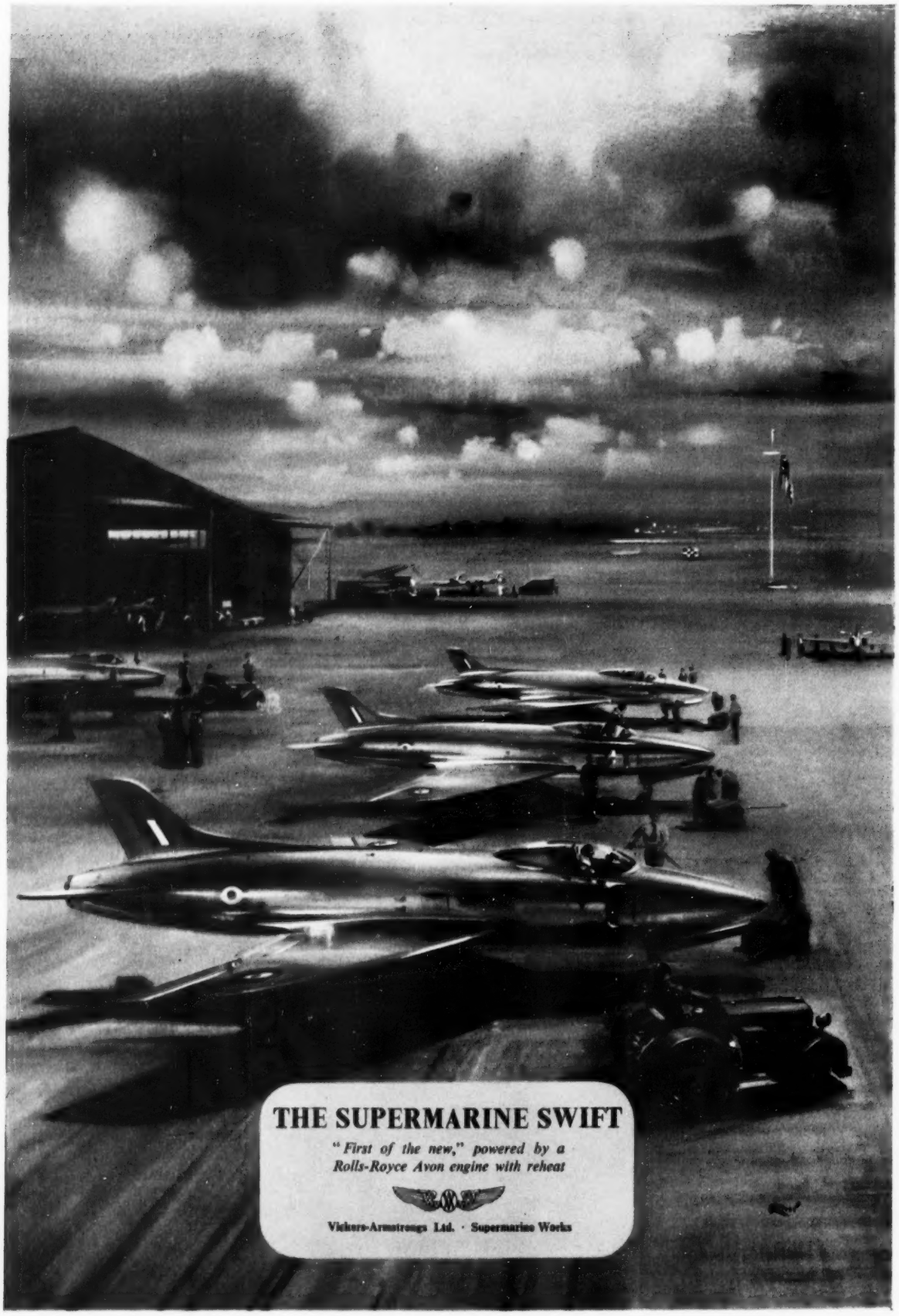
THE SUPERMARINE SWIFT
"First of the new," powered by a
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Vickers-Armstrongs Ltd. · Supermarine Works

For a completely conventional aircraft the Beaver has a remarkable take-off performance. This particular departure commenced with the wheels astride the far edge of the tarmac which can be seen roughly 80 yards from "Flight's" camera.

BEAVER 2 IN THE AIR

Leonides Power Confers an even Livelier Performance

No. 49 of the Series

By THE EDITOR

IT is hard to believe that three-and-a-half years have passed since I was invited to fly the first Beaver to come to this country; but time enough had passed for me to have forgotten the exceptional nature of its take-off and climb performances, and to be rather taken by surprise for a second time.

But first the de Havilland Beaver 2 prototype must be introduced. It is basically the same as the standard Canadian military Beaver built to meet a sizeable American order. In this airframe has been installed an Alvis Leonides 502/4 to replace the standard Wasp Junior. (G-ANAR, we are told, was originally the second L-20 prototype.) In addition, a new, shapely fin and rudder of larger area have been fitted and the size of the horizontal surfaces has been inconspicuously increased. The work has been done entirely in Canada, and a Canadian C. of A. has been obtained. The purpose of this as yet one-off conversion is to provide a demonstrator for the parent company at Hatfield to show to the British Army and others who have indicated a genuine interest in it. Should a good order be forthcoming—and prospects seem excellent—the Beaver Series 2 would almost certainly be put into production in this country.

Certain important differences exist in addition to those apparent at a glance and mentioned above. For example, extra tankage has been provided in the wing-tips; more powerful disc brakes are fitted; and a steerable tailwheel (25 deg each side) with rudder interconnection has been incorporated.

The small-diameter (41·5in) Leonides gives 100 h.p. more than the Wasp Junior (46·1in diam.) and, being geared and carrying a three-blade 9ft D.H. airscrew, it is much quieter and appreciably smoother. The airscrew is, of course, of non-feathering type and, in fact, gives high windmilling drag. In operation, however, it is more efficient than the two-blader fitted to the Beaver 1, so the new prototype profits by more than the 100 h.p. difference in engine s.h.p. The Leonides overhaul period is at present 600 hours which compares with 1,000 hours for the Wasp.

Extremes of climate are well looked after in the Leonides power unit, which has been cleared for cooling under tropical conditions and in its direct-injection induction system incorporates an oil-heated throttle assembly which should preclude icing troubles. Hundred-octane fuel would normally be specified for the Leonides, but minor modifications permit the use of lower grades. A Rotax electric starter is fitted for this first Beaver 2; the Plessey Coffman cartridge starter would be an alternative.

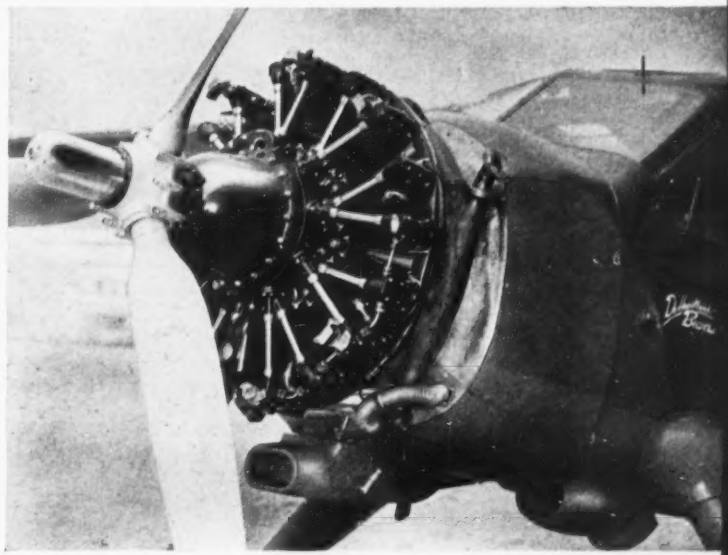
The present installation adds some 65 lb weight and the power unit is considerably longer, thus bringing the c.g. rather far forward. Should production be ordered, the Leonides accessories, at present arranged as for the Provost, would be regrouped suitably and the installation shortened. In addition, radio and other equipment could be shifted further aft without inconvenience.

It may be recalled that the gross weight of the Beavers is 5,100 lb and that they can carry a pilot and six passengers.

Unlike the early examples, the Beaver 2 has a wing stressed for supply-dropping; the racks are located just outboard of the struts. Rockets or 2 × 500 lb bombs could be carried for *Type Colonial* duties. It is because of the possibility of an assymetric load that a rudder trimmer has now been fitted.

Fuel is carried in five tanks with a total capacity of 113 Imp. gallons. Normal load is front tank and centre tank 29 gal each, and rear tank 21 gal. To this may be added 34 gal in the built-in tanks in the wing-tips.

It should be stressed that the Beaver 2 retains all the qualities of ruggedness and weather resistance of the standard mark, and could equally well be placed on floats or skis to carry out its work of light transport—passengers or cargo—communications, ambulance, supply-dropping, and so on.



An Alvis Leonides 502/4 (as produced for the Provost) is accessible and lends itself well to this prototype installation. If production of the Beaver Series 2 is undertaken, rearrangement of accessories will lead to a shorter installation. "Flight" photographs

Two pleasing aerials of the Beaver 2. Note the new enlarged fin and rudder and the longer nose associated with this Leonides version. When these photographs were taken the aircraft was carrying its full complement of seven people. "Flight" photographs

BEAVER 2 IN THE AIR . . .

To know and appreciate the Beaver 2 it would be desirable to use it for a month or two on the sort of work for which it is intended. This, of course, would equally well apply to most aircraft, but more so, I think, to a versatile small-field machine which flies in partnership with its pilot rather than under the somewhat remote direction of a crew on routine operations.

My recent afternoon with the Beaver 2 started when de Havilland pilot "Dickie" Blythe demonstrated the take-off and landing for a small bunch of spectators. Next, I had the same thing done to me while strapped in the co-pilot's seat, and finally I moved over to the port seat and had a go.

Taxying calls for little comment except to remark that the steerable tailwheel gives precise control. There is no call to use brakes or bursts of engine when manœuvring. It feels best when the machine is kept rolling at 10 to 15 m.p.h. The brakes, which are operated by toe pedals on the rudder, give a powerful response; they are smooth and progressive in their effect, so one feels confident about using them good and hard when required. They are of Goodyear disc type.

The fact that large transparent panels have been let into the cabin roof makes for a brighter cockpit and, more important, improves the pilot's view above and to the rear.

Before take-off there is the customary check-list to think about —although for the Beaver "list" is perhaps, a misnomer for a few simple actions. Trimmers are placed at about neutral; the mixture and pitch levers are set; fuel-contents and taps are checked; and flaps are selected and pumped down to take-off on the indicator. Regarding these various controls I would express the personal opinion that the trimmer wheels might with advantage be a little larger and a little closer to hand. The pitch and throttle controls are also rather high and far forward for comfort. The flap-selector lever, on the other hand, is near to the hydraulic pump handle on the floor between the seats.

Where practicable, the grouping of such controls on a central pedestal, or in a unit projecting from the instrument panel, is preferable for convenience; but then the centrally mounted swing-over control "wheel" of the Beaver makes this rather difficult to arrange.

For my first take-off I was content to line up into wind on the grass runway at Hatfield and then open up gently for a normal departure. Even tackled this way the machine gives you a royal shove in the back as the Leonides develops its full take-off power, and before the pilot has time to think about a take-off run he is airborne and climbing rapidly. There was no appreciable swing-tendency during the short run.

On a subsequent take-off I tried opening-up against the brakes and letting the tail come up before moving off. On this occasion I had just time to check that we were keeping straight as we started to accelerate, then to see the A.S.I. needle was showing just over 50 m.p.h. before making a gentle stick-back movement which nevertheless fairly hoisted the Beaver into a climb-away. This procedure, and the take-off run, are clearly illustrated in the heading photograph on the previous page.

The performance is the more surprising when one considers that the Beaver is a completely conventional high-wing machine with simple, average-sized flaps. The take-off setting of the flaps corresponding to maximum-lift position represents the full movement independent of the ailerons. Further lowering droops the ailerons as well as the flaps by means of automatic linkage.

The Leonides really gives the impression of getting down to business when turning at 3,000 r.p.m. at about 47in (+8 lb) boost for take-off. But at all other times, and particularly when cruising down at 2,000 r.p.m., it seems to be doing its job in a most leisurely manner. On the approach with power practically off the Leonides responds smoothly and immediately. This is a most desirable—even essential—feature on slow approaches for short landings, and it is a distinct advantage associated with direct fuel injection —in this case of Hobson manufacture.

To return to the rapid take-off, it is, I think, preferable to keep the stick a little back and the tail down, for, although the machine will then unstick almost at stalling speed, the power and acceleration are such that there seems to be no danger. The alternative of pushing the stick forward for the short run and then pulling it well back to assume and maintain the steep attitude of climb causes a disconcertingly big attitude-change and calls for an undesirable amount of stick movement. No one seemed to know whether the difference in techniques has any important effect on the length of take-off run.

Having become airborne, the Beaver, as I have mentioned, continues to climb in a lively manner—with a maximum rate of 1,560 ft/min. (This compares with 1,100 ft/min for the Beaver 1.)

The cockpit is roomy and the pilot has a better all-round view than can usually be arranged with the high-wing configuration. Engine and airscrew levers are mounted middle and high on the panel; flaps selector and pump are on the floor; trimmers are in the roof.

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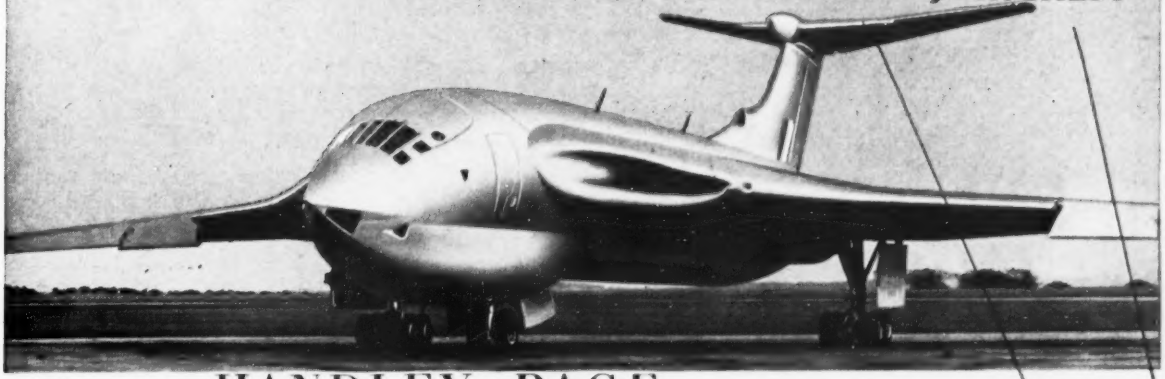

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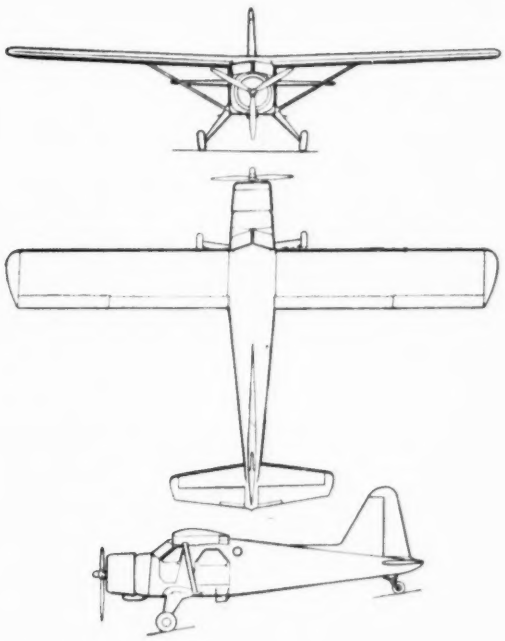
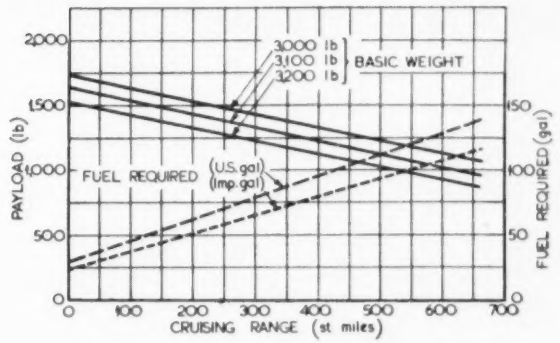




Payload/cruising range curves for the landplane Beaver 2. Allowances are for ten minutes warm-up and take-off; climb to 5,000ft and reserve for 45 minutes flight at destination. Power setting at 5,000ft; 2,400 r.p.m.; zero boost (280 b.h.p.); true cruising speed 135 m.p.h. at max. all-up weight.

BEAVER 2 IN THE AIR . . .

These figures were measured for an a.u.w. of 4,900 lb, which represents aircraft equipped weight, fuel and 1,000 lb payload. The best speed for maximum angle of climb is 75 m.p.h., while for best rate it is about 92 m.p.h. I learned that the best angle, which to me felt very steep, is equivalent to a gradient of 23 per cent; car drivers may be able to visualize this better when it is expressed as 1 in 4.3. The take-off performance permits clearance of 50ft trees in 235 yards from starting point at the above-mentioned weight.

During my comparatively short experience I made less use of the trimmers than I might have done when accustomed to the machine. It seemed more important to accept the light pull force during the initial climb and to concentrate on attitude and speed and power settings. Once the engine was throttled back, the trim was more or less correct in the centred take-off setting.

Under ordinary flight conditions the Beaver 2 feels very little different from the Mk 1 or from other well-designed high-wing types. Controls are light and well-harmonized, and for accurate turns the rudder must be freely used. The machine can be trimmed to fly hands-off but exhibits no pronounced stability. When cruising at around 2,000 r.p.m., even in this aircraft with fairly austere military cabin trimmings, the noise of the engine is no more that a purr.

One sees very well out of the Beaver even though the small diameter of the Leonides cannot confer the usual advantages because of the size of the bulkhead close behind it and the need for airscrew clearance. On the ground and climbing there would be some advantage if the outside lower corners of the windscreen could be extended down an inch or two to follow the cowling line. It would be no hardship to lose a little panel area, for it is large and carries only the few essential instruments.

It seemed to me that the stall of the Beaver 2 is rather different from that of the Mk 1. It is less clearly defined and there is no appreciable warning. In some aircraft in which the stall and consequences are important these comments would constitute adverse criticism, but that is not so, or intended to be so, of the Beaver. To stall at all from power-off level flight the stick must be hauled onto its back stop, and then the nose does no more than waffle non-commitally below the horizon. There does not seem to be any tendency to drop wings or attempt to spin, and recovery action produces immediate and satisfactory results with little height loss. The main indication of the stall is that all three controls have gently and progressively run out of effect. The climb and descent indicator exaggerates the stalled descent rate as the altimeter confirms. With flaps down and power off the A.S.I. speed at the stall is 45 to 48 m.p.h. At 55 m.p.h. I.A.S. and take-off flap setting, the Beaver flew normally, but with spongy yet adequate aileron control.

These qualities give promise of good approach and landing control at low speeds, and these the Beaver 2 proved to have. At about 100 m.p.h. on the cross-wind leg I selected and pumped down some flap. To descend, the Leonides was throttled back almost to idling. Previously I had tried closing the throttle rapidly in cruising flight and opening up from idling to full climb. From this I expected to learn something about trim and response. The most notable point which did emerge was the powerful braking effect of the airscrew when windmilling. I noted also the flexibility of the engine, and, once again, the marked attitude-change between descent and climb. Trim-change was very moderate.

The braking effect of the airscrew and the flaps permit a steep descent at a comfortable speed, say 80 to 85 m.p.h., and with an excellent view ahead. Nearing the ground and using a trickle of engine power, 65 m.p.h. is a safe speed when flying fairly light (two passengers and an average fuel load). Glide approaches should be made at about 90 m.p.h. The ailerons, particularly when drooped with full landing flap, are not exactly brisk, but they provide sufficient control. When one is ready to land a gentle pull brings the Beaver into three-point attitude and a smooth touch-down follows with the minimum of help from the pilot. It is best to trim back a little on the approach and, if one has done so, an overshoot and steep climb-away with full flap down seems that much easier, because the nose settles a little higher while flap is pumped off. In fact, the Beaver would overshoot on half power, I feel sure.

Although the prototype Beaver 2, as mentioned earlier, is long nosed and has a forward c.g., the powerful brakes can be applied sufficiently to skid the wheels without fear of nosing over. The shortest landing run was about 10 yards longer than that for the take-off. It is a pity that non-skid brakes are, as yet, too expensive and complicated to be considered for this kind of aircraft.

So far little has been said about interior arrangements because these are not peculiar to the Mk 2 Beaver. I noted, however, that the seats are sufficiently comfortable, have the usual means of adjustment and are very easily removed. The cockpit section has a pilots' door on each side and there is a very large additional door on each side of the cabin. These large doors, coupled with the exceptionally roomy cabin or hold, enable the Beaver to handle all sorts of bulky freight and equipment. From figures provided, I noted that the c.g. datum is 82.5in forward of the leading edge, and that the forward and aft limits are 93.7in and 107.7in.

From a study of the Beaver's design and equipment and this second experience of its latest flying performance I do not find it hard to account for the Army's interest in the machine.

Various manufacturers' data and performance figures follow.

DE HAVILLAND BEAVER SERIES 2

(One 550 h.p. Alvis Leonides 502/4 with de Havilland airscrew)

Span	48ft	14.62 m
Length	30ft 3in	9.22 m
Height	10ft 7in	3.23 m
Wing area	250 sq ft	23.25 sq m
Cargo volume (aft of pilot)	125 cu ft	3.54 cu m
Equipped tare weight (inc. radio, 78 lb)	3,255 lb	1476 kg
Maximum all-up weight	5,100 lb	2313 kg
Payload for 600 naut. miles	1,150 lb	521 kg
Take-off over 50ft with 1,000 lb payload	700ft	213 m
Take-off over 50ft at max. a.u.w.	1,020ft	310 m
Landing over 50ft with 1,000 lb payload	760ft	232 m
Landing over 50ft at max. a.u.w.	1,260ft	380 m
Military take-off run at a.u.w.	765ft	235 m
Military landing run at a.u.w.	930ft	280 m
Absolute range	1,010 n.m.	1,868 km
Service ceiling	23,000ft	7,010 m
Endurance with allowances	9 hours	
Max. level speed, 5,000ft	150 kt	275 km/hr
Econ. cruising, 5,000ft	120 kt	220 km/hr

MARAUDER DE LUXE

AiResearch Convert Wartime Bombers into Executive Transports

A MONTH ago we published an article on the conversion of Catalinas into veritable airborne yachts; now comes this description of what seems to be an even more complete transformation, this time of a famous bomber type. Although the cost of such conversions is high, they do provide the purchaser with a "custom-built" transport of a kind unobtainable in the new-aircraft market at any price.

TO those for whom the words "converted bomber" conjure up recollections of crawling through a bomb-bay into the passenger cabin of a B.O.A.C. Liberator, or riding side-saddle to Sydney in a Lancastrian, the pictures on this page are commended.

The exterior of the aircraft is at once recognizable as a Martin B-26 Marauder bomber*; but we would challenge anybody to identify the interior, which must surely be the most luxurious ever built into a private aeroplane, not excepting the personal transport of a very rich middle east potentate which is complete with revolving throne!

It is the work of the AiResearch Aviation Service Company of Los Angeles, and the aircraft illustrated is the first of two B-26s converted for the Tennessee Gas Transmission Company and the Continental Can Company. Choice of the Marauder as raw material for an executive transport was no accident. It is the only war-surplus military aircraft which can be adapted to carry 16 passengers in comfort at more than 300 m.p.h. for a range of 2,000 miles, and so rival the times of U.S. transcontinental airliners.

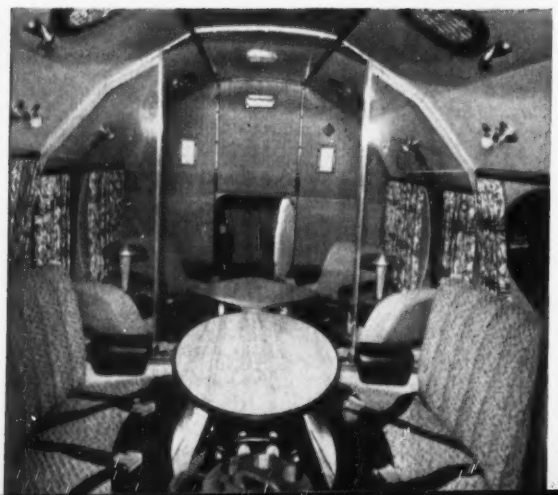
First reports indicate that flying and handling characteristics are very good indeed. The aircraft will cruise at better than 300 m.p.h. at 10,000 ft on about 65 per cent power. A take-off run of less than 2,000 ft is claimed and use of reversible-pitch airscrews keeps the landing run also to under 2,000 ft—an improvement that only wartime B-26 crews would be able to appreciate to the full.

Unfortunately, AiResearch have no photographs showing the full extent of the job; but some idea can be gained from the fact that a Marauder airframe as received by them is stripped until only 26 per cent of the original remains. Control surfaces, tail unit, flaps, undercarriage, cockpit controls and equipment, engines, airscrews, fuel and oil tanks and all systems and services are removed, together with all structure built into the airframe solely to carry military load and not essential for basic structural strength. Only the bare shell remains, around which AiResearch build what is virtually a new aeroplane, complete with every modern item of equipment to ensure maximum efficiency and safety.

Fuselage Modification.—First job after stripping the fuselage is to inspect it thoroughly and repair any cracks, dents or loose rivets. Front and rear bomb-bay doors are removed, and that area is completely rebuilt and reskinned as an integral part of the fuselage monocoque. Frames for new windows are installed under and aft of the wing, including two very large, oval-shape windows just forward of the tailplane. The Plexiglas nose is replaced by a smooth metal fairing and the rear gunner's turret by a long pointed tail cone. A large, downward-opening cabin door with built-in steps is fitted in the port side of the fuselage forward of the wing.

To leave unrestricted space for the passenger cabins, the control cables, including those for the trim tabs, are re-routed over the top of the centre-section and along the top of the rear fuselage. The co-pilot's rudder pedals are rebuilt to incorporate brakes and he is provided with a duplicate elevator trim wheel on the new

**Not to be confused with the Douglas B-26 Invader, which was originally designated A-26.*



(Left) What was once the bomb-bay, amidships, now accommodates a four-seat divan, convertible into a sleeping berth. (Below, left) Opposite the divan are two swivel chairs and a table. (Below) The 10-passenger rear lounge, seen looking forward over the back of the six-place horseshoe-shaped divan.

grateful thanks from my wife and myself to you and your colleagues who assisted in getting my daughter and son-in-
home f ika, which by now you will have learnt t
safe heir journey at Blackbushe yesterday aft
noo re you we are most grateful to you all
Fro sed by my daughter and her husband there
no d that this service of yours is to say th
least ful. They both speak most highly of
the c on extended to them by all on board ar
en route. What is more, I feel perh might

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pleasure to be able to look
forward to the same crew

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OPINIONS I wi ue by return

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I was most favourably impressed with all the arrange ments that were made, with the service of your personnel and with the efficiency attending the flights, and I should like you to know that these special

I arrived at BLACKBUSHE in your flight from Karachi, Pakistan yesterday and would like to let you know how efficient I thought the Service was. Everything over which the crew had control

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MARAUDER DE LUXE . . .

main control pedestal. Other new equipment includes gust-lock mechanism and an A-3 autopilot servo.

Wings and Power Plants.—Chief modifications to the wing structure are those necessary to accommodate 1,550 gallons of fuel entirely within the wing, with adequate structural strength to cater for landing at full designed all-up weight. This involves modifying the structure between the fuselage and nacelles, and from outboard of the nacelles to the inboard end of the ailerons, to accommodate Goodyear Pliocel nylon fuel tanks with an approximate total capacity of 1,350 gallons. In addition, the outer wing panels, from the inner end of the aileron to the tip attachment, are converted into integral fuel tanks of about 200 gallons capacity. Access doors are provided under each tank for routine maintenance and repair. The fuel system itself has been redesigned so that fuel can be passed from any of the four tanks to either engine, through two selector valves. Booster pumps and Liquidometer fuel gauges are fitted in each tank.

The power plants, too, are completely modernized, the old 2,000 h.p. Pratt and Whitney R-2800-43 Double Wasps being replaced by either two 2,100 h.p. R-2800-83AM3s or by two 2,400 h.p. R-2800-CB-16s, as used in the DC-6B and Convairliner 340. The 83AM3s require no modification of the engine mounting; but new ring cowling, accessory cowling, carburettor air and oil cooler intakes are needed, and the exhaust system and firewall have to be modified. In addition, a long dorsal fin has to be fitted to ensure directional stability. On the CB-16 installation, the engine mounting too has to be modified, because the carburettor is 3in farther aft; and, if a water injection system is installed, the extra power requires a rather larger dorsal fin.

Oil, Oxygen and Hydraulic Systems.—A new AiResearch oil cooler and regulator are fitted for each engine, together with an oil dilution system; but the existing 43-gallon oil tank is retained in each nacelle, modified to include a two-gallon reserve in each tank available only for the airscrew feathering pump.

The high-pressure, constant-flow oxygen system is new, drawing its supply from two 63 cu ft bottles. Outlets are provided by each passenger seat, with two more in the crew compartment and one in the toilet.

The hydraulic system is also entirely removed and rebuilt. An electrically-driven auxiliary hydraulic pump is installed for emergency extension of the nosewheel in the event of failure of the engine-driven pumps; and there is a complete emergency system for operating the main undercarriage, flaps and brakes.

Electrickery and Radio.—The electrical and radio installations are an outstanding feature of these AiResearch Marauders, being as up-to-date and efficient as in any comparable post-war executive transport. The modern 28-volt electrical installation is a single-wire system earthed to the aircraft structure, which acts as the negative side of the circuit. All circuits terminate in a main junction box, located in the vestibule and containing circuit breakers for individual protection of each circuit.

A General Electric P.2 generator with a capacity of 200 amp is mounted on each engine, with a new 24-volt battery in each nacelle. There is also a socket in the port nacelle for 24-volt external supply, and a 200-amp Ranger auxiliary power unit in an enclosed compartment in the tail, complete with its own fire-warning and CO_2 fire extinguishing system.

Electrical services include a call system, cabin lighting, individual reading lights for each seat, navigation lights, taxi light, ice lights, landing lights and special cockpit lighting. Grimes hooded lamps illuminate every dial on the specially designed main instrument panel; and a new electrical panel is installed to suit the specified instrument and radio installations. In the Tennessee Gas Transmission Company's machine these include:—

Sperry Zero Reader system, phase adapter and C-2A Gyrosyn compass; two R-5/ARN-7 A.D.F. receivers; two MN-60A Bendix iron-core loop assemblies; two B-3 dual A.D.F. indicators; two MG-149H inverters; N-600A flush marker aerial; two ARC-1 V.H.F. transceivers modified for 50-channel operation; two 37R-1 Collins V.H.F. communication aerials; interphone amplifier; 51R-3 Collins V.H.F. navigation receiver with omni-bearing selector; 51V-1 Collins Glideslope receiver; Western Electric F-3 cabin phone; two Lansing cockpit speakers; eight cabin loudspeakers; and Audio Pacific cabin entertainment equipment.

De-icing equipment was not specified for the first two AiResearch Marauders, but all necessary attachment fittings and a distributor valve are fitted for installation of de-icer boots on the wings, tailplane and fin. A complete heating and ventilation system is provided, the former supplied by two 100,000 B.Th.U. Janitrol heaters, located in the aircraft nose. The heater compartment has its own fire-warning and CO_2 extinguisher system.

Cabin Furnishing.—The entire cabin and vestibule are soundproofed with high-frequency absorbing mica, cemented to the skin and nowhere is there less than 2in of Grade A Fibreglass. The rear baggage compartment, cockpit and nose compartment are soundproofed with mica only.

The interior arrangement varies, of course, in accordance with the customer's individual ideas. The cabin of the Tennessee Marauder, shown in the photographs, has been divided into three sections. At the front is the entrance vestibule, complete with buffet, storage space, clothes closet and toilet. Then comes the centre cabin (in what was the bomb-bay area), with two swivel chairs and a four-seat divan which can be used for sleeping when the arm-rests are removed. Finally is the rear, ten-passenger lounge, which includes a very comfortable, six-seat, horseshoe-shaped couch, under the large oval windows.

No prices have been quoted for publication by AiResearch—who point out, quite rightly, that they must vary according to the condition of the B-26 when received for conversion and the standard of equipment and furnishing required by the purchaser. But, after a worldwide search, the company has recently located a further batch of surplus B-26 airframes, which are being shipped post-haste to Los Angeles. There is apparently no shortage of prospective customers for them. J. W. R. T.

TRAINING FOR HIGHER TECHNOLOGY

WITH the object of acquainting those in industry with the latest application of scientific principles to industrial methods and techniques, a handbook* has been recently published by the London and Home Counties Regional Advisory Council for Higher Technological Education. In it are given details of special advanced courses to be held in the London and Home Counties region during the 1953-54 academic session, and which do not regularly appear in college calendars or prospectuses as a part of the normal curriculum.

Most of the courses listed are part-time (and usually given in the evenings), but specially arranged full-time courses of up to three months' duration are also included. The standard of entry varies, but many of those of aeronautical interest are suitable for aircraft firms' apprentices and newly-joined graduates requiring specialist training. Apart from the directly aeronautical courses such as those in aerodynamics at Imperial College, Chelsea Polytechnic, Kingston Technical College, Northampton Polytechnic, and the new Hatfield Technical College, and in aero-engine design at the School of Gas Turbine Technology, the number of associated subjects is large. It includes servo-mechanisms, statistics, elasticity and other applied mathematical branches, metrology, applications of electronics, methods engineering and management studies.

This first part of the bulletin lists these courses taking place during Autumn, 1953; a second part, to be published in December, will deal with courses to be given in Spring and Summer, 1954. Both parts of the bulletin are obtainable from the Secretary, Regional Advisory Council, Tavistock House South, Tavistock Square, London, W.C.1.

**Bulletin of Special Courses in Higher Technology 1953-54 (Part 1). London and Home Counties Regional Advisory Council for Higher Technological Education. Price 1s. 6d.*

MASTERS OF ARTS

INTERVIEWED by Moscow Radio just before Russia's Air Force Day (August 9th), Lt.Gen. of the Soviet Air Force Terentyev expressed some sentiments which have a familiar ring, but seem worth quoting. In the course of his remarks the General said that, fulfilling the tasks set by the Party and the Government —"To fly farther than anybody else and to fly faster and higher than anybody else"—Soviet airmen had made their motherland glorious by their prominent achievements. In 1934 Hero of the Soviet Union, M. Gromov, flying an ANT-25, after staying in the air for 75 hours 12 minutes, covered 12,411 kilometres without landing—a world record for length of flight. In 1935, Hero of the Soviet Union V. Kokenaki, flying a plane of Soviet production, reached a height of 14,575 metres, beating the world record held by the Italians. The flights by the crews of W. P. Chkalov and M. Gromov across the North Pole to America represented a triumph for the Soviet Air Force. The might of Soviet aviation, continued the General, had been demonstrated at its best during the Great Fatherland War (i.e., the Second World War). Over 2,000 airmen were awarded the title of Hero of the Soviet Union; more than 60 became twice Heroes of the Soviet Union; and Pokryshkhin and Kozodub gained three Golden Stars.

During the post-war years, the Soviet Air Force and civilian aviation began a new phase of development: "Our airmen were the first in the world to master the art of higher individual and group navigation in jet planes. The best proof of the nation's love of its air force is the participation of millions of Soviet workers in the propaganda campaign for the spreading of technical and aviation knowledge."

Footnote: The Soviet press and radio did not report the Canberra altitude record, nor any of the many recent achievements of the Western aviation industries. On the other hand, any major air crash that happens in the West is promptly publicized.

GASOLINE, JP-4 OR KEROSINE?

Availability and Properties: A Call for Fuel-standardization

ALTHOUGH military turbojet aircraft have for several years been operated all over the world and on a large scale, it is only now that turbine-powered airliners are coming into service in any numbers. The de Havilland Comet and Vickers Viscount are already in airline service; one or two American piston-engined transport aircraft are being converted to turboprop power on an experimental basis; and other turbojet and turboprop transports are projected for the near future on both sides of the Atlantic. The next ten years, therefore, will undoubtedly see the introduction into regular operation of several hundred turbine-powered civil aircraft. Among the many problems attendant upon the introduction of jet transports is that of the fuel which their engines will use, for despite early hopeful statements to the effect that the gas turbine would burn anything from coal dust to candle ends, actual requirements, both technical and economic, dictate a choice from a fairly small group of fuels.

The military requirements are such that, although kerosine is in many ways the best fuel for turbines, the demand for it in a global war would far outstrip production capacity. Both the U.S.A.F. and the R.A.F., therefore, have issued specifications, called JP-4 and DERD 2486 respectively, for wide-cut distillate fuels that embody portions of the gasoline, kerosine and gas oil ranges and effect a compromise between combustion requirements and availability. War-time military jet operations, however, would require infinitely greater quantity and wider distribution of fuel than it is necessary to provide for civil flying purposes within the next 10 to 15 years. The maximum number of turbine transports in world-wide operation by 1960-1962 is unlikely to exceed 500, at a generous estimate, and their daily fuel requirements are estimated to equal only 0.8 per cent of the daily world crude-oil production forecast for those years. Moreover, the oil refineries claim that all suitable types of fuel can be produced with equal ease so long as requirements are made clear by the users. For civil jet operations now and in the future, therefore, there is no great problem in choice or availability of fuels.

Fuel Efficiency

The actual fuel used, consequently, will in all probability be selected for its technical efficiency, since in satisfying the notorious thirst of the turbine engine the operator will require the greatest efficiency, and therefore ultimately the greatest heat (in British thermal units), produced for a given cost. It is the total B.Th.U. content of a jet fuel, and not its volume or weight, which determines its efficiency.

Kerosine, from this point of view, is in the middle of a group of three jet fuels, JP-4 (wide-cut distillate), kerosine and automotive diesel. (Coal-dust and candle-ends can be excluded as aircraft fuels, for although equipment exists for adapting them for combustion in turbines, it is far too heavy and bulky to be considered for aircraft use.) Automotive diesel is both the cheapest fuel and has the highest heat content per gallon, but it would require extensive engine development and such complications as tank heating before it could be used without drastically reducing engine overhaul life. Thus the choice must lie between JP-4-type fuels and kerosine.

The comparatively high vapour pressure (8 to 10 lb. Reid) of motor gasolines creates serious vapour-lock and fuel-boiling problems in a jet transport. JP-4 fuel under typical conditions differs little from gasoline in general characteristics, since 70 per cent of its constituents comprise fractions boiling within the gasoline range. To overcome this, tank pressurization (not employed in the Comet, which uses kerosine) would have to be introduced, with its attendant complication and cost. It appears, on the other hand, that while no freezing trouble has been met so far on the Comet, whose kerosine has a freezing-point specification of -40 deg C (-40 deg F), a lower freezing level may be required. This would be in the region of -46 deg C (-50 deg F) and would overcome the problem of fuel freezing during prolonged cruising at high altitude. Failing this, some form of tank heating—or, more simply, tank insulation—would be required.

The de Havilland Enterprise, makers of the first jet transport, express a very definite preference for kerosine. In an article in the current issue of their house journal they quote the fact that though kerosine has an advantage in B.Th.U. per gallon, JP-4-type fuel has a slight lead in B.Th.U. per lb. But these small differences in heating value are swamped if the relative prices of the two fuels are taken into consideration. In the estimate of cost, outlined above as B.Th.U. per penny, kerosine has an advantage of approximately 8 to 10 per cent.

Convertibility of JP-4 to kerosine is another factor dealt with by de Havillands. In the event of American civil operators choosing JP-4 and British operators kerosine, convertibility might become highly desirable in intercontinental operation. The NATO air forces have introduced convertibility in fighters, to allow mobility, without serious penalties in range or endurance. Over an average one-hour sortie a few minutes' endurance are involved and a cost difference with which military operations are not greatly concerned. For the civil airliner, on the other hand, where precise range, endurance and weight calculations must be made for safe and economical operation, the problem of flow-measurement and exact efficiency variations between the two fuels renders convertibility practically impossible to achieve in operation.

A definite choice is indicated, then, between JP-4 and kerosine. Both can equally well be produced and distributed by the refineries, but kerosine is cheaper and more efficient technically; and, last but not least, for the civil operator kerosine is safer. It does provide a positive advantage over JP-4 in reducing the risk of fire, both in the air and on the ground.

In JP-4 the conditions for the rapid spread of fire always exist, while in kerosine they arise only rarely. The readiness with which a given fuel will produce an inflammable vapour (i.e., its volatility) depends on its temperature. Below a certain temperature the small amount of vapour rising from the surface of the fuel will be so diluted with air that it becomes harmless. It is not until a critical temperature is reached that a dangerous inflammable mixture can be formed—if the fuel is ignited below the critical temperature it will burn, but the flame will spread only slowly. With JP-4 an inflammable mixture can form in the air at any temperature above about -20 deg C (-4 deg F), whereas in the case of kerosine such a mixture will not be formed unless the temperature is above about 35 deg C (96 deg F). In considering these figures it is important to remember that the fuel carried in a jet aircraft is cooled by the low air temperatures encountered at cruising altitude. Kerosine fuel can be mechanically atomized by a severe impact and thus form a highly inflammable mixture which will burn with a rapidity amounting almost to an explosion, irrespective of the temperature. Such atomization could occur in the case of a violent crash, but an impact sufficient to cause this effect would also undoubtedly prove fatal to the occupants of the aircraft.

In the case of a fuel leakage in the vicinity of the tanks, pipelines or in the engine compartments, the small amounts of vapour given off by kerosine will not form an inflammable mixture if the ventilation is good. On the other hand, JP-4 will certainly produce an explosive mixture in such circumstances unless the vapour-air mixture is kept below the weak ignition ratio. This would demand a degree of ventilation very difficult to achieve.

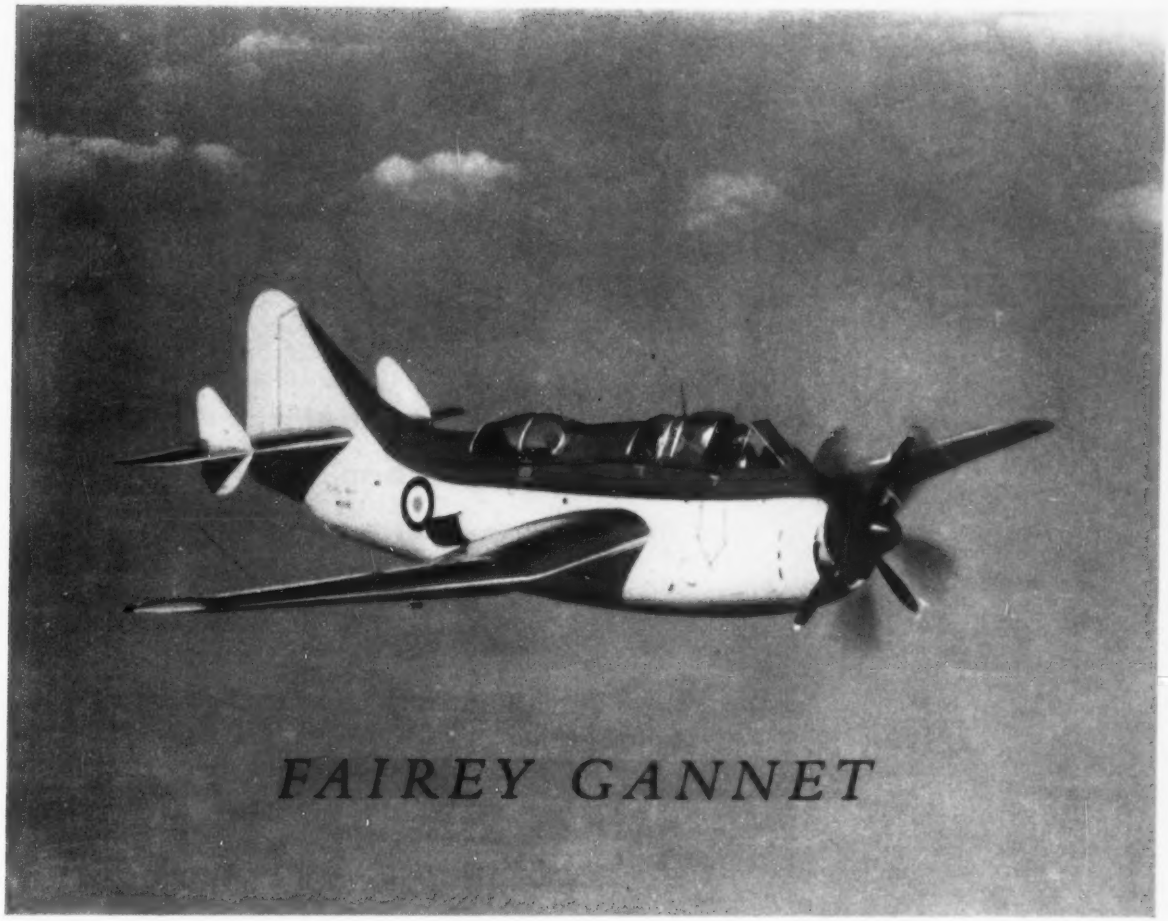
At all temperatures below about 35 deg C (95 deg F) the use of kerosine greatly reduces the risk of catastrophic fire in the air or following a crash; a similar degree of safety is not found with JP-4 until the temperature is reduced to about -20 deg C (-4 deg F), and temperature falls slowly while the aircraft is gaining and maintaining height.

The weight of evidence, and of the opinions so far obtained from a producer of jet transports, indicate a very definite advantage in the use of kerosine fuel rather than of any other available type. The point which emerges from both the refiners' and operators' points of view is that to make a really significant economy, standardization is highly desirable. Concentration over the next 10 to 15 years on one type of jet fuel would prove beneficial to producer, distributor and operator alike, and could avoid a repetition of the complications which arose out of the varied requirements for different octane petrols in high-powered piston engines.

LONDON GAS-TURBINE LECTURES

A COURSE of evening lectures on gas-turbine technology is to be given at the South East London Technical College, Lewisham Way, S.E.4, by Mr. Roy C. Orford, M.Sc., C.P.A., A.M.I.E.E., patents manager of Power Jets (Research and Development), Ltd. Starting on October 13th, the course will consists of ten weekly lectures, and the fee is £1 15s. A brief synopsis is as follows:—

Historical Development: Classic proposals; pre-war work in Switzerland, Hungary and Great Britain; application to aircraft propulsion; British and German development of early jet engines. *Cycles:* Open and closed; effect of intercooling and reheat; compound cycles. *Applicability:* Jet propulsion; shaft power production for purposes other than aircraft propulsion. *Design and Construction:* Axial and centrifugal compressors and turbines. *Combustion Systems:* Heat-exchangers; fuel problems; manufacturing processes.



THE Royal Navy, which has to maintain sea communications, regards counter-measures to the submarine threat as of first importance. Much of the new anti-submarine equipment is specialised, and demands unique capabilities and characteristics from the aircraft employed. To cover this feature of defence the Fairey Gannet is in super-priority production, and has also been ordered for the Royal Australian Navy.

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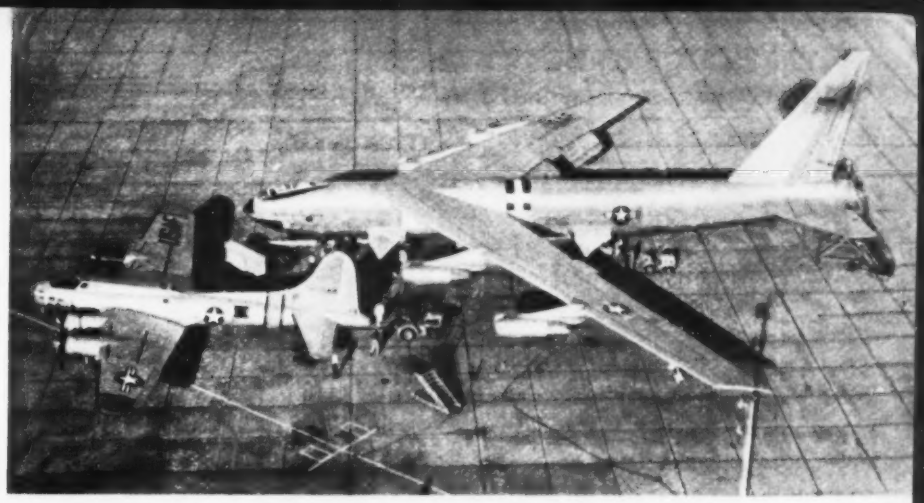


THE YEARS BETWEEN: Time was when the Boeing B-17 was considered a big aeroplane; and indeed it was, with its span of 103ft 9in. But stand it beside the six-jet B-52, as above, and it no longer impresses by its bulk, though it has a service record which will never diminish with the years. The B-52 spans 185ft. Just as sharply contrasting, below, are the Fairey Swordfish (left) and Westland Wyvern S.4—strike aircraft of two generations.

AIRCRAFT INTELLIGENCE

Great Britain

Short S.B.6. Although an aircraft bearing this designation is deduced by *Aviation Week* to be a long-range patrol bomber incorporating boundary-layer control devices (see *Flight* of July 24th) it is linked in this country with an anti-submarine aircraft which is soon to appear. It remains to be seen whether the machine will make its début at the S.B.A.C. Display.

U.S.A.

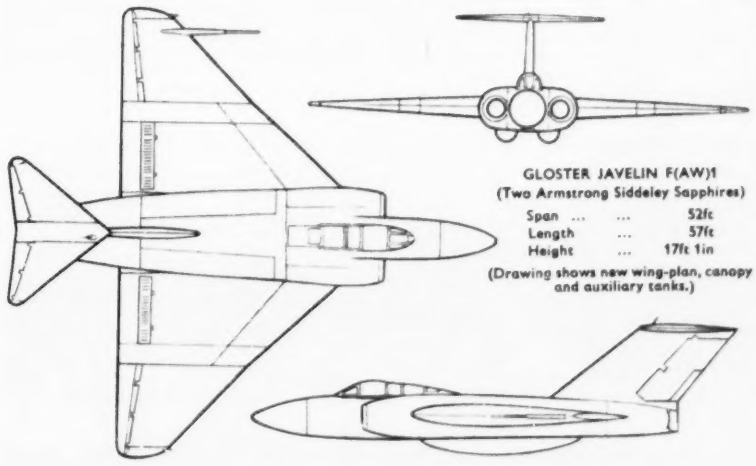
Boeing B-47 Developments. Illustrated last week was the Boeing RB-47E, a new version of the basic B-47E Stratojet bomber for use as a day or night long-range photographic reconnaissance aircraft. A second development is the RB-47B, which is a converted Stratojet bomber, usable either in the P.R. rôle or as a medium bomber. The principal differences between the RB-47E and the standard B-47E bomber include a lengthened nose and an air-conditioned camera compartment. The new machine is being built by Boeing at its Wichita, Kansas, Division, where production of the standard B-47E bomber continues. Douglas at Tulsa, Oklahoma, and Lockheed, at Marietta, Georgia, are also building the B-47E. Like other Stratojets, the RB-47E has a three-man crew. Photographic equipment includes intervalometers, an optical view finder, and photocell-operated shutters which are actuated by the light of flash illuminants for night photography. The air-conditioning system in the camera compartment maintains uniform temperature and humidity and keeps the windows free of moisture or frost. The RB-47B is fitted with a convertible "camera pod" or "package," and conversion from bomber to photographic reconnaissance aircraft requires only the removal of the bomb doors, attachment of the "pod" to standard fittings, and the connection of heating and electrical lines.

North American FJ3 Fury. The U.S. Navy recently announced successful first test flights of a development of the North American Fury, designated FJ3 (the Fury is the naval adaptation of the Sabre). Interest in this machine centres on the power plant—a Wright J65 (Armstrong Siddeley Sapphire licence)—which is said to give a speed of about 720 m.p.h. The new fighter is in the preliminary stages of production at the Columbus, Ohio, plant of North American.

Convair B-36. The number of Convair B-36 bombers completed, and still being finished, is 346. A development of unusual interest, in connection with the type, is reported by *Aviation Week*. The makers, it seems, have conducted tests on a wired television arrangement for scanning visually the pusher engines and propellers while in flight from a remote monitor installation in the aft cabin.

ZP4K Airship. Designed for detecting and tracking submarines, the ZP4K "blimp" is the latest Goodyear product for the U.S. Navy. Its speed is quoted as 65 kt and the power plant is two Pratt and Whitney Wasps mounted on outriggers and driving 11ft 6in Hamilton Standard airscrews. Envelope capacity is 527,000 cu ft of helium. The original ships of the "K" class, 130 of which were built during the war, were of 456,000 cu ft capacity.

New Light Aircraft. The very attractive Cessna 310 light executive machine (see *Flight*, March 27th, 1953) is now being extensively flown preparatory to full production early in 1954. The first prototype is being used as a test-bed for modifications, while No. 2 aircraft undergoes a 1,000-hr accelerated service test. On the West Coast, John Thorp has developed his Skooter into the Super Skooter—a side-by-side, all-metal design with a fixed nose-wheel undercarriage. It is hoped to market the aircraft in "knock-down" kit form. The well-known Johnson Rocket is now being manufactured by Regent Aircraft of Edenburg, Texas. The more powerful version of this Bonanza-like design has a 400 h.p. flat-six engine and is claimed to cruise at up to 260 m.p.h. Finally, the Mooney 18 Mite single-seater is being developed into two military types for liaison work. Mooney, it is reported, now expect to produce one civil Mite a day, while "grooming the four-place Scotsman prototype for quantity production."

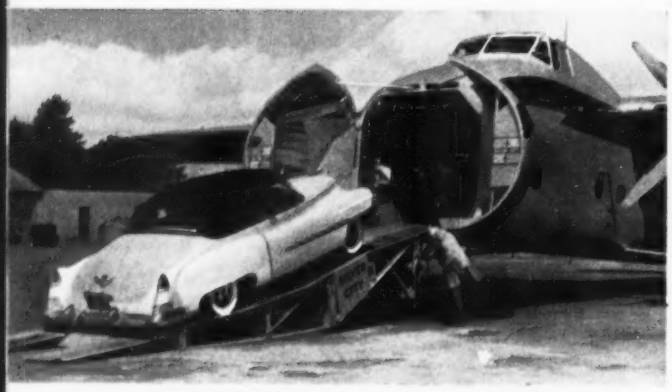


GLOSTER JAVELIN F(AW)1
(Two Armstrong Siddeley Sapphires)

Span	...	52ft
Length	...	57ft
Height	...	17ft 1in

(Drawing shows new wing-plan, canopy and auxiliary tanks.)

EVERYDAY AIRLIFT: SILVER



The Superfreighter can carry two of the largest cars—such as this 19ft Cadillac—or three smaller vehicles.

A busy tarmac scene of this kind usually greets the driver as he turns into Lympne Airport.

Company drivers load an aircraft in 5 min, and within another 4 min cars and passengers are airborne.

A Mk 32 Superfreighter takes aboard its payload while, in the background, an earlier Mk 21 is unloaded.

MORE than a quarter of the total vehicle traffic ferried between England and France is now carried on the routes operated by Silver City Airways. The air ferry, which recently celebrated its fifth anniversary, has entered its busiest season. Bookings for this year are expected to total 45,000—compared with 10,900 vehicles carried last year. Of the 38,000 bookings already received, 31,500 are for the short Lympne-Le Touquet route, 5,000 for the Southampton-Cherbourg crossing, 1,000 for Lympne-Ostend and the remaining 500 for the recently opened Gatwick-Le Touquet service.

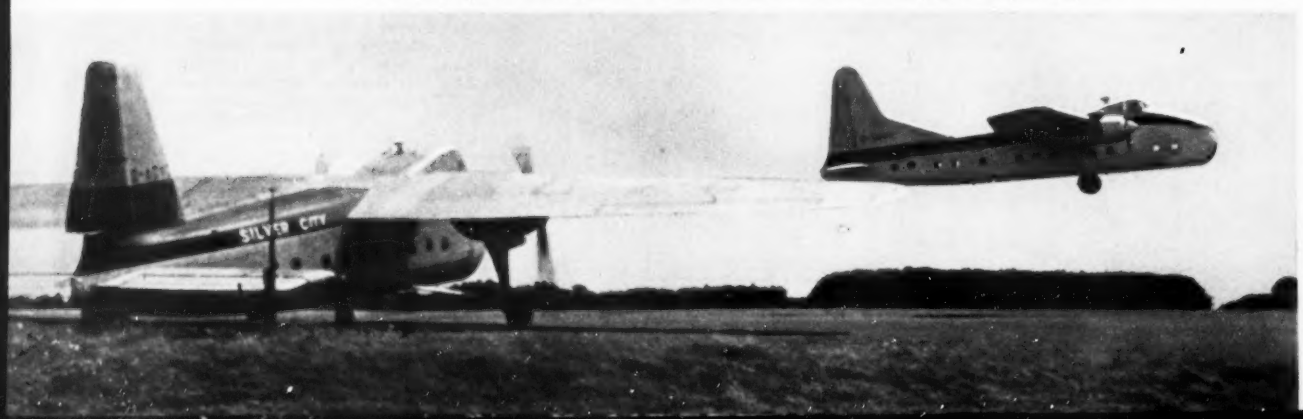
At Lympne, the scene of these sunny new *Flight* photographs, the tempo of activity must be seen to be appreciated. At peak week-ends the Superfreighters and Freighters land or take-off every 2 min 18 sec. The 47-mile journey to Le Touquet takes 22 min, and aircraft are averaging 36 landings and take-offs each on the busiest days. Silver City claim that no other commercial aircraft are subjected to such rigorous use as are their Bristols, which continue to give extremely reliable service.

The company's fleet now consists of eight Bristol 170 Mk 21s and six new Mk 32s, specially developed for the Channel ferry. The majority of the fleet are to be seen at Lympne, which handles 80 per cent of the traffic. Although motor cyclists and pedal cyclists are making increasing use of the service, cars still represent 50 per cent of the company's vehicle traffic—and, of course, a considerably greater proportion of the total revenue.

The number of passengers accompanying vehicles is frequently less than the number of seats available in the cabin aft of the hold. To an increasing extent, the extra seats are being taken up by "pedestrian" passengers who find the 20-minute service to France excellent value for the price (£4 10s) of a return ticket. Over this coming week-end Silver City expect every available passenger seat to be filled on the 180 services daily scheduled for the Lympne-Le Touquet route.

Further substantial increases in air-ferry traffic are expected next year. Lympne, already working at maximum capacity, is incapable of further development; Silver City Airways recently announced their decision to establish their own terminal, to be known as Ferryfield, to handle the extra traffic.

As a Superfreighter takes off, a Mk 21 Freighter waits to turn on to the grass runway at Lympne.



CITY'S CHANNEL FERRY

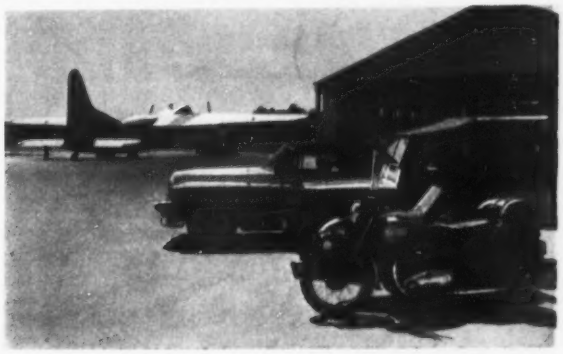
"Flight" photographs

Still going strong: This Bristol 170 Mk 21, one of the first to be built, has been used intensively since the ferry began.

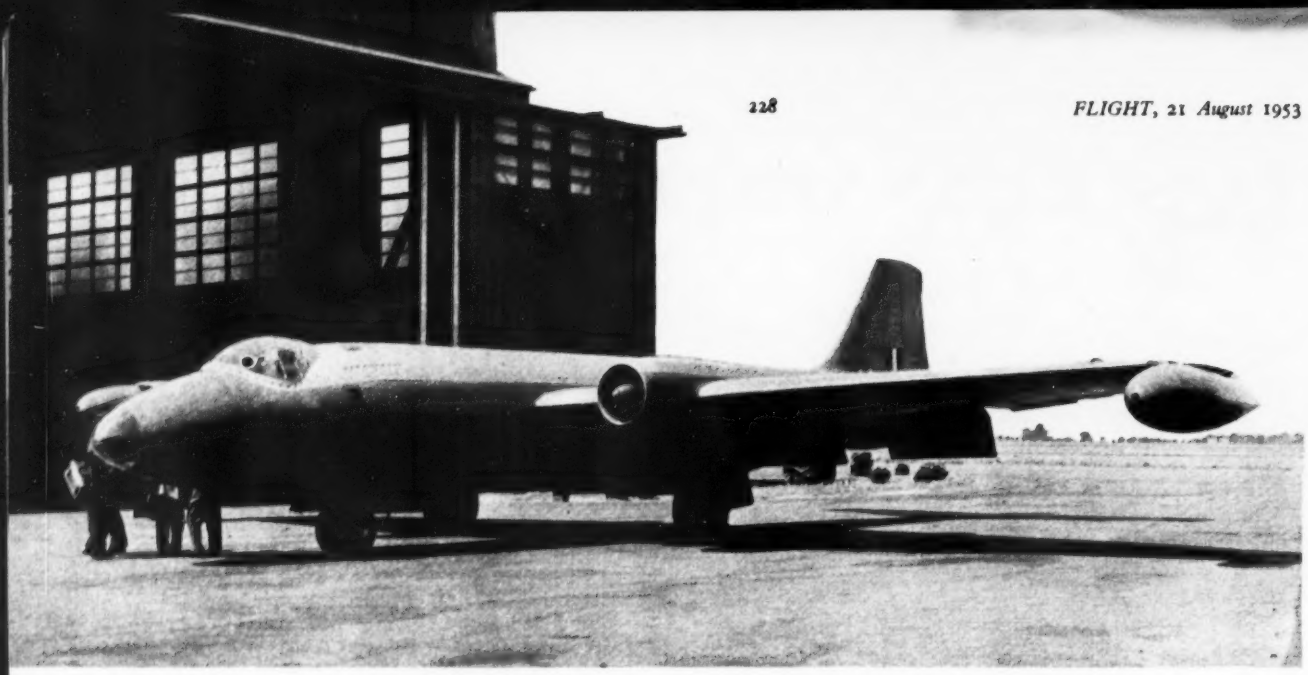
Accompanying passengers—up to 20 in the Superfreighter, 12 in the earlier version—fly in a plain but comfortable cabin aft of the cargo hold. Passengers without vehicles also use the service.

Driven by a two-stroke engine, this mobile ramp was developed jointly by Silver City and Hythe Engineering, Ltd.

Passengers report to the new reception counter at Lympne. (Below) Some 10,000 cyclists will fly the Channel this year.



These vehicles form only part of a Superfreighter load. (Below) Drivers use the new filling station before departure and on return, empty. Fuel is less dear on this side of the Channel.



CANBERRAS IN TRAINING

—for the New Zealand Race: R.A.F. Plans along the Way

"FLIGHT" Photographs

The senior crew: W/C. L. M. Hodges, D.S.O., D.F.C. (in charge of the R.A.F. Canberra Air Race Flight), and his navigator, S/L. R. Currie, A.F.C. Above, one of the brand-new P.R.3 machines for the race, seen at Wyton.

ON its existing record, alone, of high-speed, long-distance flying, the Canberra seems to have indeed a better chance than most other aircraft of winning the speed section of the forthcoming England-New Zealand Air Race. The Royal Air Force has entered three Canberra P.R.3s and one Valiant aircraft for the race. We were recently able to visit the Canberra unit in training, and to learn from the crews something of the planning and hard work which is going into their attempt. Preparation of the Valiant (which we hope to describe at a later date) is being carried out separately, by Vickers-Armstrongs, Ltd.

The Canberra Air Race Flight, under the command of W/C. L. M. Hodges, D.S.O., D.F.C., was formed at the R.A.F. Station, Wyton, near Huntingdon, on June 4 last, and it was at Wyton that our visit to the flight was made. The aircraft are standard P.R.3 machines, with the addition of extra fuel tanks (increasing the capacity to 3,100 gallons) and extra navigational equipment for the trip. To accommodate these items, certain military equipment has been removed.

Three two-man crews, and one reserve crew, are in training for the race. The pilots and navigators have been selected from Bomber Command squadrons with recent Canberra experience, and one of the crews (S/L. L. G. Press, A.F.C. and F/L. J. W. Harper, D.F.C.) took part in the Canberra tour of South and Central America last year.

The initial route-planning and consequent organization was based on an optimum stage-length of some 2,700 statute miles for the Canberras. From this, the five-leg route decided on was London—Shaibah (Iraq)—Negombo or Ratmalana (Ceylon)—Cocos Islands—Perth—Christchurch, a total distance of 12,270 miles. At each of the staging points there will be an experienced 30-man Canberra servicing team under the command of an Engineer Officer, responsible for the rapid re-fuelling, oxygen re-charging and overall turn-round of the aircraft. Assuming no major snags, turn-round times of 20-30 minutes are expected.

The preparation of a flight plan by the navigator for the next leg of the trip would normally consume much time on the ground, and materially affect the turn-round time. To cut out this delay, a navigation officer will be stationed at each of the staging points, and he will collate the available nav. and met. information and prepare the flight plan for the next leg, reducing considerably the work load on the airborne navigator.

Navigation is, of course, an important basic problem on such a flight, and much work has gone into this aspect of the planning. The tracks chosen (straight lines on a Mercator-projection chart) are rhumb lines, but are tangential to the Great Circle track, the actual shortest distance. Courses are to be changed every 10 degrees of longitude, to stay as close as possible to the Great Circle. Equipment carried will include a radio compass, a periscopic bubble-sextant for astro-navigation, a V.H.F. communications set, and Rebecca (to obtain accurate distance-measurement on the let-downs and approaches).

Further members of the Air Race Flight: (left) F/L. D. H. Gannon, D.F.C., and his pilot, F/L. R. L. E. Burton, A.F.C.; (right) S/L. L. G. Press, pilot of the second crew, and the reserve crew-members, F/L. R. MacA. Furze and F/L. T. E. Dunne.

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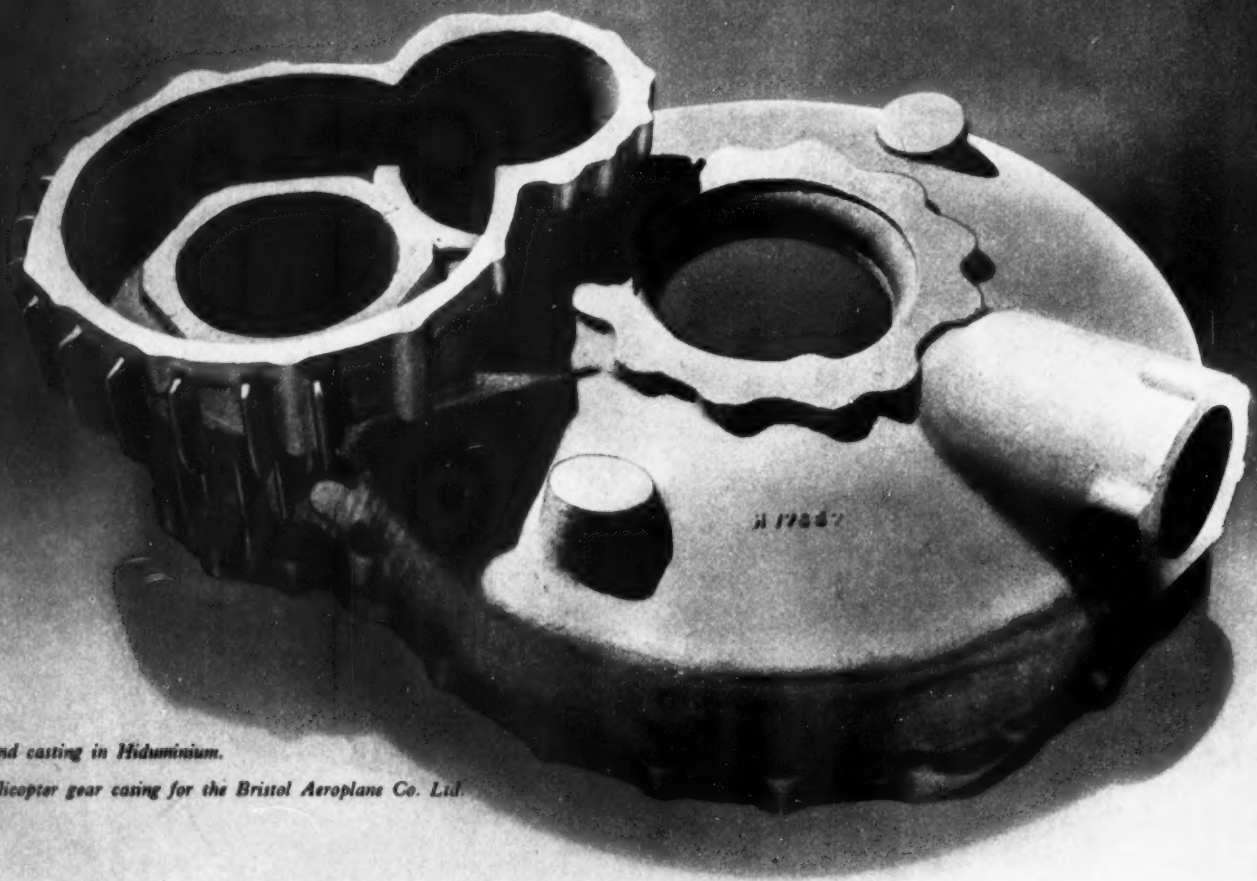

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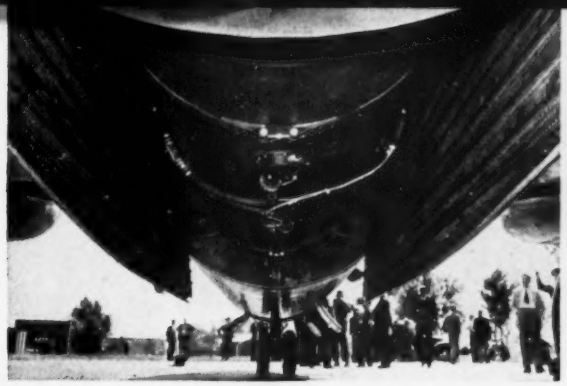


Vive les petites différences! Non-standard additions to the racing Canberras: (Left) In the bomb-bay, an extra fuel tank helps to raise the total capacity to 3,100 gallons. (Right) Beneath the fuselage, the radio-compass aerial.

CANBERRAS IN TRAINING . . .

The first leg is 2,875 miles and is planned to take about 5½ hours. At Shaibah a night landing will be made before commencing the 2,635-mile leg to Colombo, Ceylon. Here, after the five-hour trip, one aircraft is being scheduled into Ratmalana and two into Negombo, owing to the possibility of freak local storms (presumably, if one of these airfields was under bad weather the alternative base will be used by all three aircraft).

The third leg—1,771 miles and 3½ hours from Ceylon to the Cocos Islands—is probably the most difficult one from the navigational point of view. As this sector is flown in daylight, only the sun is available for astro-navigation during the period when both end-points of the leg are out of radio range. Sufficient fuel — 1,000 gallons reserve — is carried for a diversion to Changi (Singapore) to be made if the small Cocos atoll is not located after the planned time.

Conditions for the fourth leg (1,840 miles, approximately 3½ hours) are similar to those of the third, but with better radio aids as the Australian coast is approached. After a night landing at Perth the final leg (3,150 miles, 6 hours flying time) will present navigators with a choice of two alternative plans. If the strong westerly winds expected over Australia materialize then the rhumb-line track for this leg, which takes advantage of these winds, will be used. The Great Circle track, however, is some 60 miles shorter and if the winds are not strong enough to give a sufficiently high ground speed using the rhumb-line, then the shorter and more southerly Great Circle route, which passes over Tasmania, will be employed. As the Canberras should land at Christchurch shortly before dawn, it is to be hoped that early morning mist—the only meteorological hazard frequently experienced there—will not be present, otherwise a diversion to Auckland might be required. The decision would have to be made some 800 miles from New Zealand.

Total time for the London-Christchurch journey by R.A.F. Canberra is estimated to be 24½ to 25 hours, including stops. This gives an average speed of about 500 m.p.h., but does not take into account the westerly jet streams which are quite likely to be present over parts of the route. Assuming no major snags on the aircraft themselves, it does seem a strong possibility that the Canberras can make the trip in less than 24 hours.

Flight Techniques

The flying technique for the race, as mentioned, was determined largely by the stage-lengths selected. The stages having been chosen, the object was naturally to fly as quickly as possible over each given leg. A direct Ceylon-Perth leg had been considered; but it would have entailed flying more slowly for maximum range, and as little high-altitude-weather information over the Indian Ocean was available, the Cocos stop had been introduced, resulting in the two comparatively short stages between Ceylon and Perth. The difference in cruising speed was judged to be worth the extra stop.

In general the aircraft will fly at their highest possible Mach number (the only possible exception being on the long last leg on which westerly winds are hoped for). Given this highest Mach number, the true air speed increases with air temperature and so the cruising altitude is being limited. The Canberras will fly only high enough to obtain the required range—a normal technique—but, if fuel is available towards the end of the legs, pilots will tend to descend to obtain the increased air speed. A cruise-climb technique will be used where unfavourable winds are experienced, up to the "fairly low" altitude of 30,000ft. The constant-altitude cruise, simpler and less fatiguing, is preferred, but at the weight of the competing Canberras will not always be possible; a compromise will therefore be necessary.

The machines expect to use runways of about 2,000 yd length at the staging points. The Ra3 Avons with which the Canberras are equipped have been up-rated to give what is believed to be an extra 1,000 lb thrust for take-off under tropical conditions.

Crew-training for the race has been divided into three phases, the first two of which have already been completed. The first phase involved general flying over this country in B.2 machines with practice use of the periscopic sextant, radio compass and the basic race-techniques. Phase 2 consisted of non-stop flights (also with Canberra B.2s) from this country to Malta and Cyprus and back, during which ground navigational aids were tested; and the third phase, just beginning, will be performed on the actual race aircraft, recently received at Wyton from the English Electric Co. In these aircraft, flights will be made along the actual route as far as the Ceylon-Cocos leg (although no practice landings will be made at Cocos) to provide familiarization over at least the first half of the route for the crews. A typical 24-hour practice flight would be U.K.-Shaibah-Negombo-Malta and return.

Very little will be eaten by the aircrews while in flight, due to the difficulty with the oxygen masks which have to be worn, but—as usual—barley sugar will probably be the main item. A device suggested by the Institute of Aviation Medicine, whereby orange juice may be sucked through a rubber tube, is also to be used. At staging points, meals will be available should the crews need them, although it is probable that little time will be spared for eating in the endeavour for quick turn-round times. Indeed, at certain bases, W/C. Hodges states, it is doubtful whether the crews will leave their aircraft at all, so complicated and time-consuming are the emerging and returning processes.

The effort of ground organization in support of the flight is impressive, involving some 250 ground-crew members (over 100 of whom will be at the Cocos Islands). The use of the Cocos base has caused much difficulty—fuel, three 2,000-gallon tankers, auxiliary pumping equipment from 2nd T.A.F., and Eureka equipment having been specially transported there — but has enabled a time-saving of about one hour to be made over the journey-time by way of Singapore. At each of the other staging points, six of the 2,000-gallon tankers will be stationed.

The return flight to this country will be made in seven stages, two of the longer outward legs having been split. The route will be Christchurch, Melbourne, Perth, Changi (Singapore), Ceylon, Shaibah, Luqa (Malta) and U.K.

The R.A.F. Canberras' closest competitor is felt to be the Valiant, which will make only two stops *en route*, at Karachi and Cocos. The Australian Air Force Canberras (built in Australia) are also expected to provide a close race. These machines are believed to have greater fuel capacity than the R.A.F. Canberras.

The cost of the R.A.F. participation (Canberras and Valiant) in the New Zealand Race is nominally £100,000, which sum has been set aside for the purpose by the Air Council. If an R.A.F. aircraft wins, the £10,000 prize money goes back (through the Secretary of State for Air) into R.A.F. funds. G/C. L. J. Stickley, O.B.E., D.F.C., the station commander at Wyton has emphasized, however, the immense non-financial value to the photographic reconnaissance force of the lessons learned in training for and taking part in such a race. The efficiency of the force would increase markedly as a result of experience gained during the race, he concluded, and answers would be obtained to problems which might otherwise take at least a year to solve.

Details of the main personnel in the race flight are as follows: The three air crews comprise W/C. L. M. Hodges, D.S.O., D.F.C., and S/L. R. Currie, A.F.C.; S/L. L. G. Press, A.F.C. and F/L. J. W. Harper, D.F.C.; and F/L. R. L. F. Burton, A.F.C. and F/L. D. H. Gannon, D.F.C. The reserve crew consists of F/L. R. McA. Furze and F/L. T. E. Dunne.

Training of the staging points teams has been supervised by the air race flight engineering officer, F/L. S. R. Pattinson, M.B.E., and the engineer and navigation officers at the various bases will be *Shaibah*, F/L. G. A. Graham (eng.) and F/O. D. A. Spackman (nav.); *Negombo* F/O. J. S. Millman (eng.) and F/O. M. G. Jones (nav.); *Cocos*, F/L. W. H. Collins (eng.) and F/L. M. D. Middlemist (nav.) and *Perth*, F/L. C. H. J. Clampitt (eng.) and F/O. R. F. Plater (nav.).

The race will start from London Airport at 4.30 p.m. on Thursday, October 8th. With the crews of the R.A.F. Canberras will certainly go the great expectations of all those who are conscious of the outstanding records of both the machine and the Service.

Extreme-temperature Component Testing

NOW in use by Northrop's research department is a new extreme-temperature chamber for testing aircraft and guided-missile components and materials. Temperature can be lowered from 70 to minus 85 deg F in ten minutes or raised from 70 to 180 deg F in seven minutes. The chamber is capable of operation at any temperature between minus 100 and plus 250 deg F.

The unit was designed to Northrop's specifications by the Industrial Refrigeration Company of California. Low temperatures are obtained by a "dry-ice" methanol system commonly used in the refrigeration industry. Dry ice is used to cool methanol in a sublimation tank, and the solution is then pumped through the tubes of a finned-tube heat-exchanger. A fan circulates air from the test chamber through the fins of the heat-exchanger and cools the air. An unusual feature of the unit is that it is equipped with auxiliary devices for cooling the methanol with liquid instead of solid CO_2. Use of this system is said to eliminate many of the disadvantages of dry-ice operation, such as storage losses, handling and contamination of the methanol.

Heating the chamber is accomplished by circulating air through a group of finned electric heaters.

Temperature is governed by an air-operated controller made by the Bailey Meter Company. Low-temperature control is accomplished by modulation of air-operated flow-control valves in the methanol system. For high-temperature control, the Bailey controller imposes proportional-reset action on a Taylor pneumatic interrupter, which in turn controls the electrical input to the heaters on a time-cycle basis. The control range of the unit is further enhanced by the use of a multi-speed motor to drive the air-circulating fan. The control thermocouple circuit is connected through a selector switch to four of the thermocouple terminals provided inside the chamber. The remaining ten thermocouple terminals are connected through a selector switch to a second recorder in the controller which may be used to record temperatures of specimens being tested in the chamber.

In the icebox: Northrop engineers test a Scorpion component.

The test chamber and sublimation tank, together with all operating and control components and accessories, are integrally mounted on a steel base equipped with casters. Thus the equipment may be moved to the sites of other series of tests and operated, if necessary, in conjunction with them.

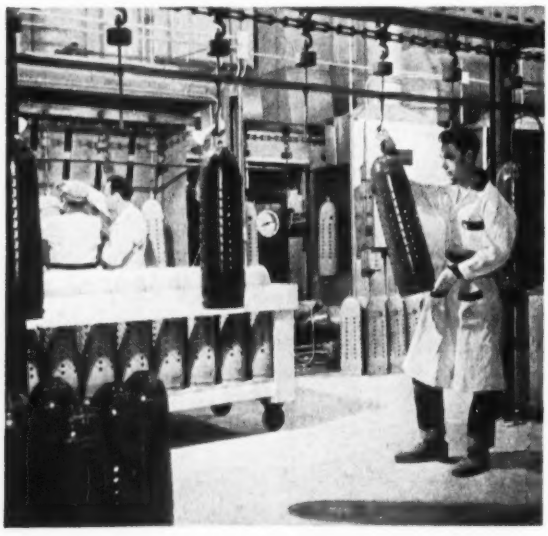
The fast rate of temperature change available in the unit makes possible the performance of several repeat tests in a single day.

MASS-PRODUCED CERAMIC COATINGS

THE Solar Aircraft Company of San Diego, California, have now set up a production-line installation for applying their "Solaramic" coatings to combustion chambers and transition liners of J-47 turbojet engines. The installation, described as a "conveyorized, mass production facility," covers 4,000 sq ft, cost over $150,000 and, with 12 men working a single shift, will produce 5,000 combustion chambers and 5,000 "transition liners" a month.

Basically, the effect of ceramic coating (which was described in *Flight*, August 1st, 1952) is that (1) by preventing burning, it lengthens the service life of parts operating at normal temperatures, (2) alternatively, that it allows parts to operate at their existing standard life, but at higher temperatures, or (3) that it permits the substitution of lower grade alloys, less rich in "strategic" elements.

Part of the Solar Company's ceramics conveyor-line



The production sequence takes the fabricated parts, cleans them and passes them to be sprayed. This is at present done manually, but a semi-automatic method is being studied. The inside is sprayed first and parts are then hung on the conveyor line before the outside coat is applied, and remain on the conveyor throughout the processing outlined below. The conveyor line now travels at 2ft a minute.

Following the spray operations, the coating is dried, using gas-fired direct-flow dryers operating at 150 deg F. After spraying, parts enter the furnace, where the coating is fired at a temperature of approximately 1,700 deg F. The gas-fired furnace has a 15ft firing zone.

When the components leave the furnace, they continue on the conveyor line while cooling. Finally they are inspected and packed for shipment. Entire cycle time, from receipt of the parts to packing of the coated components for shipping, is stated to be one hour.

Many parts of the production facilities themselves, including conveyor hooks and furnace fixtures, have been Solaramic-coated to extend their service life.

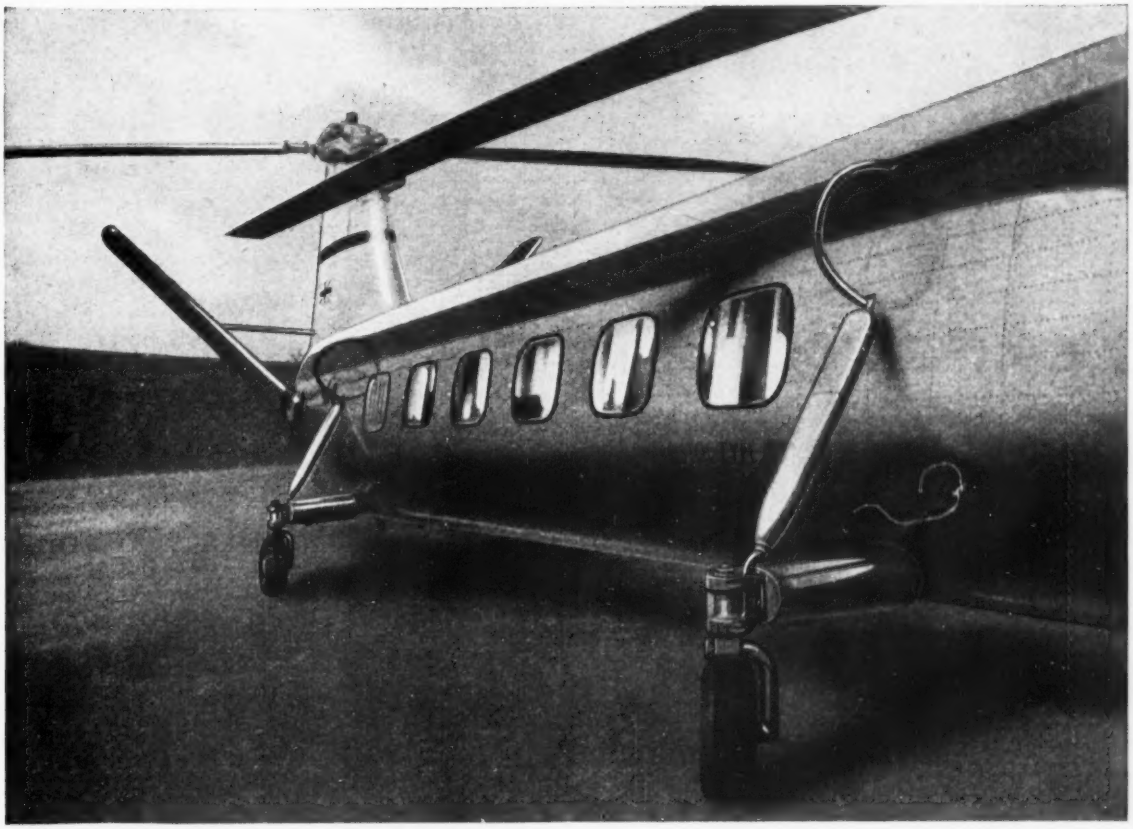
WELCOME WINDFALL

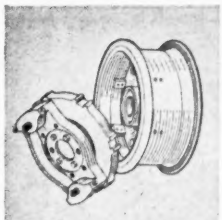
THE Royal Air Force Benevolent Fund benefits to the extent of 1,000 guineas as a result of the Coronation Year Ball organized by A. Cdre. J. A. Cecil-Wright and his son, G/C J. P. Cecil-Wright, and held at the Council House, Birmingham, earlier this year.

The total was at first just over £934; but when, during a subsequent luncheon, the organizers came to hand over the cheque to the Controller of the Fund, A. V-M. Sir John Cordingley, it was announced that Mr. James Cooper, of Sutton Coldfield, had made up the sum to £1,000 and that an anonymous luncheon guest had increased it to 1,000 guineas. Mr. Cooper served in the Royal Flying Corps during the First World War.

BRITISH MESSIER

Helicopter Landing Gear

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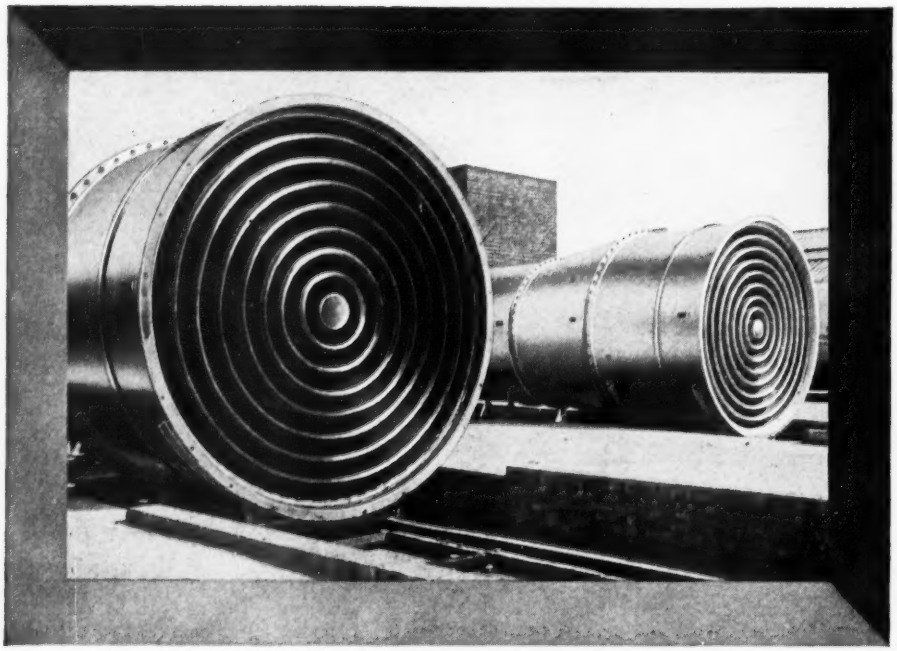

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IMPRESSIONS OF THE JODEL BÉBÉ

A French Ultra-light in Club Service

By H. BEST-DEVEREUX

A GOOD deal of interest has been shown in this country in the little French low-wing monoplane, the Jodel Bébé, particularly since the recent arrival — at the Women's Junior Air Corps Display at White Waltham — of two examples for an all-too-brief visit.

These two Jodels came from the Aeroclub of Beauvais and were flown by Georges Crucifix and André Rubichon, respectively chief instructor and secretary. Both aircraft were built in Beauvais from drawings supplied by the parent manufacturers, Avions Jodel of Beaune, Côte d'Or.

On a recent visit to France it was possible to visit the club at Beauvais in order to examine and fly these two well-made little aeroplanes. The Jodel Bébé is basically an ultra-light single-seater monoplane with a cantilever low wing having noticeably turned-up wing tips and a smallish looking rudder without an attendant fin. Many examples are fitted with an adapted Volkswagen car engine, an attractive and neat little flat four air-cooled unit giving some 27 b.h.p. at 2,600-odd r.p.m. Any engine of between 25 and 50 b.h.p. may be fitted, such as the Poinsard, A.B.C. Scorpion, or (as seen at the Paris Salon) the 44 b.h.p. Lutetia four-cylinder two-stroke engine, which is an upright vee four with port and starboard cylinder banks of air-cooled unit construction.

Simplicity has obviously been the aim of the designers while at the same time the result is of quite pleasing appearance. A deep rear decking is fitted from aft of the cockpit to the tailplane, giving the aircraft a somewhat hunched-back appearance which is accentuated by the small rudder.

The parallel-chord wing is a simple single-spar structure with a ply-covered leading edge to retain the aerofoil section. The spar is an unusual box-structure of rectangular cross-section, the width of the spar being constant throughout the span. The whole wing is fabric-covered, and the aileron gaps are sealed with fabric.

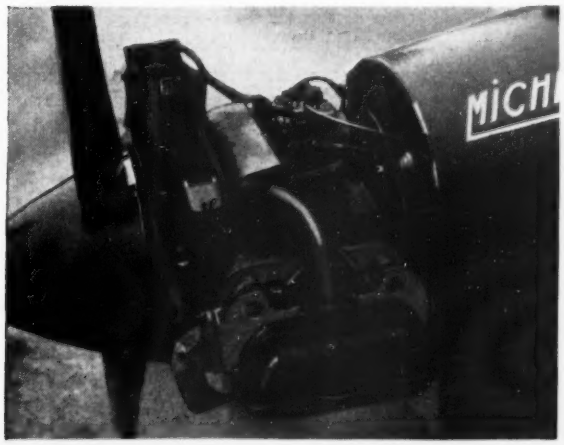
The Jodel Bébé is available either as an open single-seate or as the enclosed side-by-side two-seater seen here.

The empennage consists of a cantilever ply-covered tailplane attached by four vertical bolts to the fuselage top longerons. The square-cut rudder (slightly tapered towards its crown) is horn balanced, the leading edge being ply-covered. There is no fin except a miniscule fairing covering an elevator cable running over the top of the tailplane.

In its fuselage structure the Jodel Bébé is completely conventional. Two slab sides are boxed to form a four-longeron structure with vertical stiffeners, the whole being topped by a rear decking of semi-elliptical section with the minor axis lying across the top longerons. The fuselage is ply-covered and the bay aft of the pilot forms a luggage locker. The fuselage is recessed at the base of the cockpit to provide a snug housing for the mainplane, which has no root fillets. Sailplane-type flying controls are installed, with harmonium-type rudder pedals and a simple control column mounted on a fore-and-aft rotating tube for aileron actuation. The fuel tank, of approximately 25 litres capacity, is mounted under the front decking forward of the instrument panel.

That the undercarriage is a sound job is proved by the record of the Beauvais Club, who have had no trouble at all during something over two thousand landings by pilots of varying abilities. The main member is a streamlined tube attached to the wing spar by two heavy gauge horizontal plates, one above and one below the spar, these plates being welded to the main tube. A round-section tube with the axle welded to the base slides in shaped bushes fitted to the outer tube and uses rubber blocks in compression for shock absorption. Wheels are of Dunlop 16in x 4in wheelbarrow type and are not fitted with brakes.

A reasonable solution to the power problem seems to have



(Left) Installation of the 25 h.p. Volkswagen engine in the single-seater sampled by the author, and which is seen at left, below. The cockpit picture shows the simple panel, carrying basic V.F.R. instruments plus a ball-type slip indicator.

IMPRESSIONS OF THE JODEL BÉBÉ

been found in the use of the Volkswagen car engine, which has a luxury fitting in the form of a simple pull cable starter reminding one of the Pobjoy Swallows of yesteryear. The aircraft examined had engines fitted with single ignition consisting of a Scintilla Vertex magneto but some also have additional coil ignition providing a very reliable dual system. The engine is attached to the fuselage without any tubular mounting structure, four attachment bolts picking up direct on the fuselage front bulkhead. A tiny airscrew is fitted, a product of Régy Helices de Paris, and is fitted with a large spinner attached to a back plate.

AIR IMPRESSIONS

Flying the Jodel Bébé—in this case F-PBXV, named *Ville de Beauvais*—is a most rewarding experience, and it is easy to see why the ultra-light enthusiast enjoys single-seat flying as he does. While strong winds may keep him in the hangar a little more than the next man with his bigger aircraft, he can safely and enjoyably do his local flying in dull weather which would put off the average club pilot.

M. Crucifix—the jovial and rubicund C.F.I.—gave the writer a very quick briefing. The first item on the pre-flight check was: "Wear cycle clips or roll up your turn-ups in case a little oil should splash on them." This proved to be the only unusual part of the drill, after which the cockpit was found to be remarkably roomy for such a small aircraft. The pilot uses a very simple form of Sutton harness with a quick-release lock, and once one is strapped in, the windscreen is found to be ample enough to enable helmet and goggles to be dispensed with if desired.

Controls are conventional and instruments ample and adequate, including slip and rate-of-climb indicators, and a sensitive altimeter. The ignition switch is a simple push-pull knob which is pulled for contact.

The Volkswagen engine runs very smoothly and with a satisfying crackle from its tiny stubs. Its reaction to throttle is good, although there is a slight tendency towards carburetter icing, particularly should the mixture have been set on the weak side as was the case with one aircraft flown.

Taxying requires a fair amount of throttle to get things moving in the turn; it is advantageous not to hold the stick too far back, and additionally to make full use of ailerons. Before taking off the final check is simple enough—Engine running and fuel on." Once into wind the Jodel Bébé hops cleanly into the air after a brisk run of about sixty yards, and climbs away very smoothly. A low cloud-base prevented any accurate measurement of climb, but a rough check showed about 350ft/min at 65km/hr (40 m.p.h.) indicated and temperature about 75 deg F.

Immediately the aircraft moves forward a certain amount of left rudder is required to keep straight, and this needs to be maintained for a moment or two until the speed builds up a little. On becoming airborne one is immediately conscious of the lightness of the fore-and-aft control, which requires very little movement for a noticeable change in pitch.

In cruising flight the nose goes well down and the view is magnificent, rather giving the impression of riding an airborne motor cycle. This view, and the low speed which can be maintained, seem to suggest a tremendous safety factor. No trimmer is fitted and a slight pull is required to maintain level flight. In all conditions of flight the stick load to maintain trim is so small that it is barely noticed, particularly after (say) the Zaunkoenig, which requires an undesirable push force. The ailerons are pleasant and turns right and left can be made without rudder, although there seems to be some tendency to slip in when doing more than gentle turns on stick alone. Level-flight stability seems satisfactory for an aircraft of this type. The stall, when done gently with a little power, results in a clean level nose-drop, with little loss of height and immediate recovery. There does not seem to be any aerodynamic warning save a pregnant hush.

Gliding is perfectly straightforward at 65km/hr, an occasional burst of engine, however, being desirable to avoid the indignity of a dead-stick landing due to carburetter icing. Moderate if flattish sideslips are easily executed, although there is lightening of the rudder which could possibly result in overbalance in steeper slips. The actual touch-down, for the first time anyway, seems to result in most people pumphandling a little, until used to the sensitive stick. On landing, the Jodel Bébé sits down firmly and it would need to be a very ham-fisted effort to bounce it.

After a few circuits in *Ville de Beauvais* a flight was made in *Nichka*, the property of M. André Rubichon. In this aircraft the handling was similar, showing the consistency in construction between the two.

The impression that they were most attractive little "real" aeroplanes was heightened by M. Crucifix, who stated that since last July one Bébé had flown something like 300 hours on the club and another 150 without any trouble. The formula seems attractive; a simple aeroplane flying at 65 m.p.h. on something over one gallon of fuel an hour. Georges Crucifix showed at White Waltham that the Jodel can be aerobatted very satisfactorily, and the fact that well over one hundred have been built and flown seems to be its best recommendation.

JODEL BÉBÉ D.9 SINGLE-SEATER

Makers' data for aircraft with 28 h.p. Poinsard engine fitted.

Span	23ft 0in
Length	17ft 6in
Wing area	90 sq ft
Weight empty	315 lb
Weight of fuel and oil	45 lb
Pilot, parachute and/or baggage	190 lb
All-up weight	550 lb
Wing loading	6.1 lb/sq ft
Power loading	22 lb/h.p.
Ultimate normal acceleration	5 g.
Maximum speed	93 m.p.h.
Cruising speed	76 m.p.h.
Landing speed	29 m.p.h.
Initial climb	450ft/min
Take-off run	55 yards
Landing run	70 yards

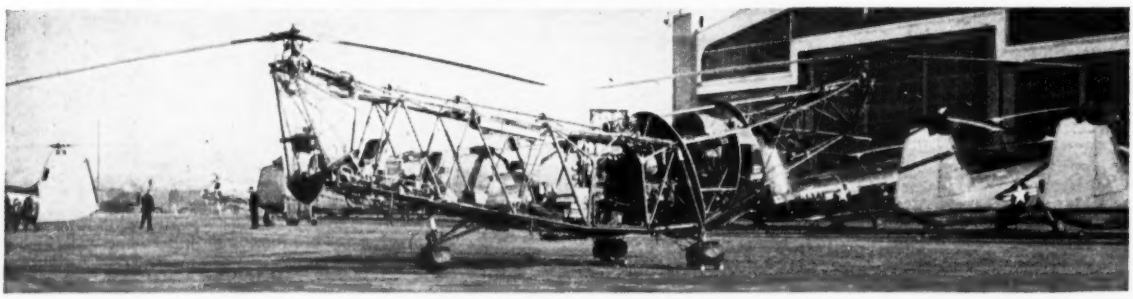
TANDEM STRIPLING

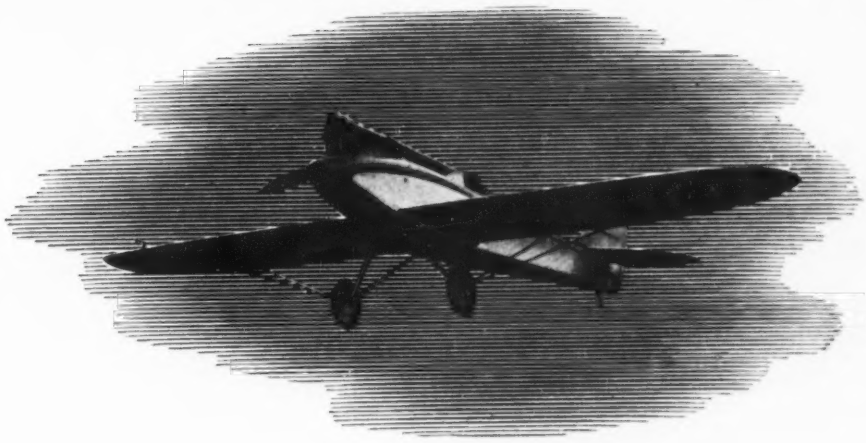
LOOKING somewhat naked with all its fabric removed, a HRP-1 helicopter (seen in the photograph) called in recently at Piasecki's Delaware plant *en route* from Lakehurst Naval Air Station to Key West, Florida. This particular machine was one of Piasecki's first successful tandem-rotor helicopters to fly and has completed over 1,000 hours with the U.S. Coast Guard on rescue development.

The bare frame, though an incongruous sight among its sleek HUP relatives in the background, does afford an excellent view of the engine installation and transmission layout.

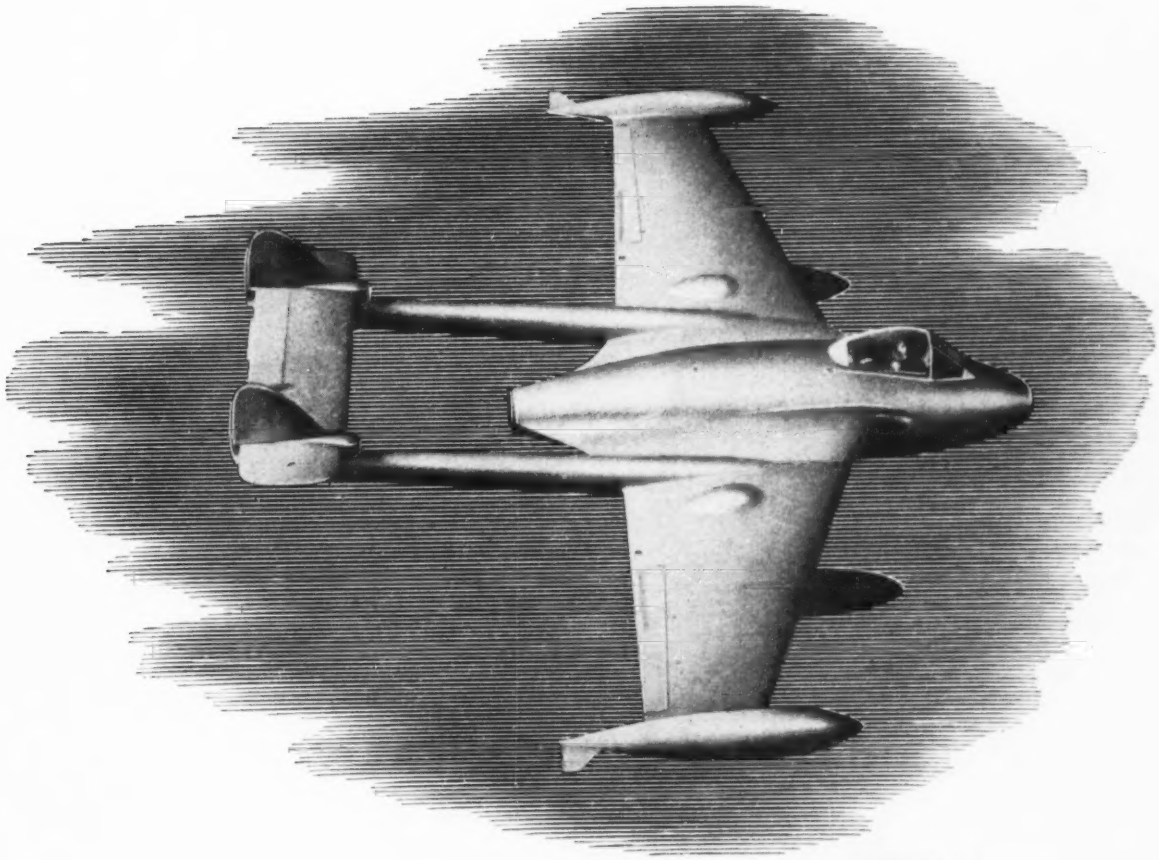
The packs around the main landing wheels are the emergency flotation gear. Designed some years ago by Cdr. Frank Erickson, U.S.C.G., the "doughtnut" pontoons are inflated by CO_2 bottles under the control of the pilot. They are of nylon fabric and when not in use offer no air resistance to detract from forward speed. In the event of an emergency landing over water being necessary (or for practice water-borne handling) the pilot's release will inflate the pontoons to their maximum in 90 seconds. Sufficient buoyancy to prevent sinking is given in just under a minute—or about 1,000 feet of autorotative descent. B.H.A.

Unlike fixed-wing aircraft, a helicopter is more or less airworthy in skeleton form: the stripped HRP-1 referred to above.





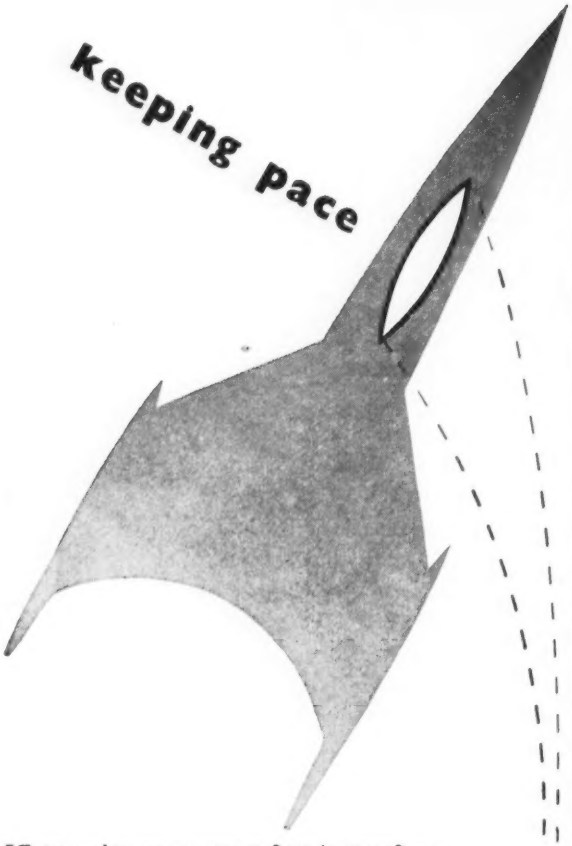
Then and now



DE HAVILLAND approve

Castrol MOTOR OIL

keeping pace



Efficient cabin construction in British aircraft may be said to date from the day when the employment of 'Bostik' became general. It was the first real answer to the problem of wind and rain. When the ceiling rose to stratospheric altitudes, it was 'Bostik' Adhesives and Sealing Compounds that brought rewarding results in the vital field of pressurisation. Today, in the supersonic age, with new achievements of one kind and another almost a daily occurrence, 'Bostik' Adhesives and Sealing Compounds enjoy the widest application and the highest trust throughout the aircraft industry. Equally confident are we that in the astronautic age ahead, there will be 'Bostik' chemists and technicians sharing those problems inseparable with the construction of craft for travel in Outer Space.

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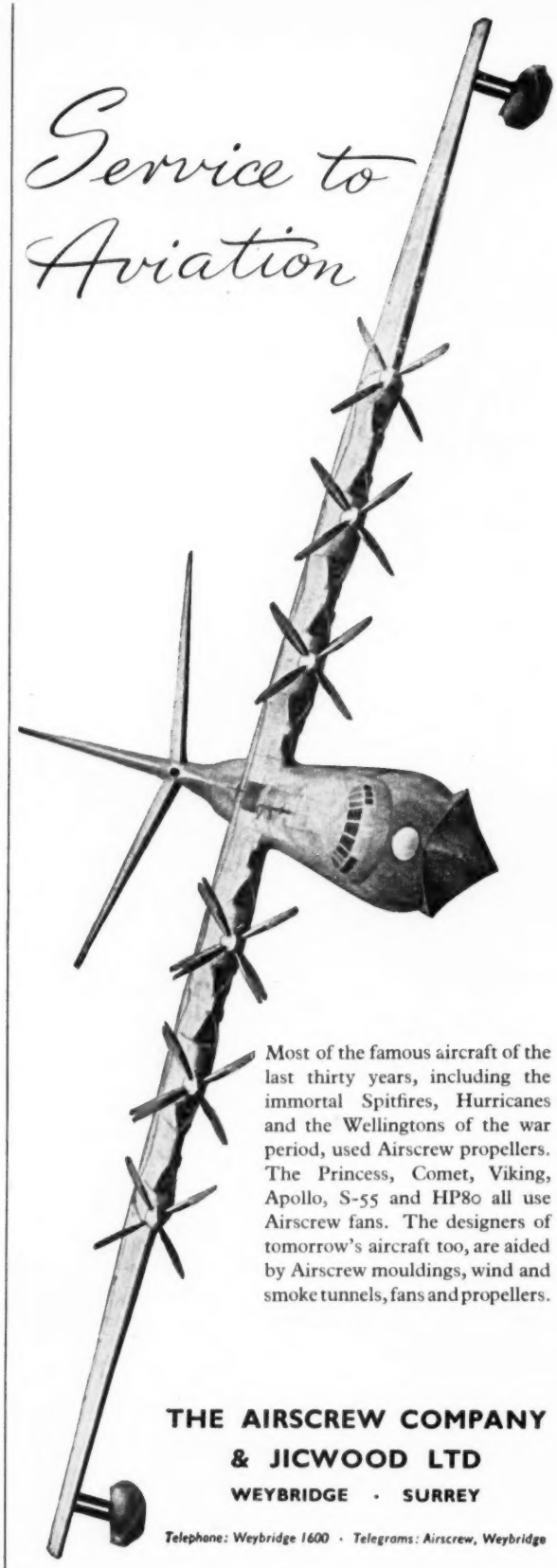

Most of the famous aircraft of the last thirty years, including the immortal Spitfires, Hurricanes and the Wellingtons of the war period, used Airscrew propellers. The Princess, Comet, Viking, Apollo, S-55 and HP80 all use Airscrew fans. The designers of tomorrow's aircraft too, are aided by Airscrew mouldings, wind and smoke tunnels, fans and propellers.

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CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

In Praise of Farnborough

I REGRET that your Editorial article of July 17th has only now caught up with me. May I add a word in praise of the R.A.E. by reminding you that their contribution to jet propulsion was of the highest significance? It was at R.A.E. that the first industrial-type gas turbine in the U.K. was installed; where much work was done on turbo-supercharging; and where the systematic study of axial-flow compressors was started. The inventions of R.A.E. men have vividly coloured the pattern of aero gas-turbine development. Dr. Griffith and Hayne Constant, when they were almost alone in Departmental circles in so doing, were intent on the future of the new kind of engine—and that required great courage in pre-war years.

London, W.1. PATRICK JOHNSON.

The S.E.5

I WOULD like to join with your other correspondents in congratulating J. M. Bruce on his most interesting and detailed history of the S.E.5 aeroplane, published in your issue of July 17th. To my mind, this series is of absorbing interest.

We have, in the Shuttleworth Collection, the complete airframe of an S.E.5, and it is my hope that, in the near future, we shall be able to commence the reconstruction of this historic aeroplane. We are, however, requiring a petrol tank, tail skid, and a Wolseley Viper engine to complete the machine.

If, by any chance, any of your readers is in possession of any or all of these items (particularly the last-named) or knows where they might be obtained, I would be most grateful if he would get in touch with me at The Shuttleworth Collection, Old Warden Aerodrome, Biggleswade, Beds.

Old Warden, Beds. L. A. JACKSON.

Airline Pilot Error

I SUBMIT that your editorial on July 31, in connection with the Nutts Corner accident, does not go far enough. Perhaps you were limited for space; but maybe you will allow one who has acted as a second pilot on airline flying to offer some comments.

First, I do agree that it is most unlikely that a second pilot would have made the same error at the same time if he had been in control of the aircraft. But with some of your further arguments I am unable to agree.

You say you are led to suppose that in an avoidable accident the co-pilot must normally be otherwise engaged, for if it were not so he would voice his opinions to the pilot. But would he voice them? No, not always, because by the time a *potentially* dangerous situation has passed that critical point which separates it from an *irretrievable* situation, it is too late to speak. Let me explain this generalization with an example. Think of yourself as a 1st officer sitting in the right-hand seat. On final approach the captain begins descending very rapidly from 1,500 feet with little power and much flap on. This is only potentially dangerous, because at any time down to a certain height it is possible for him to add power, arrest the rate of descent and proceed to a safe landing or overshoot; but once past that height no addition of power will be sufficient to overcome the aircraft inertia before it touches the ground short of the runway. Suppose this height to be 500 feet. At 1,000 feet you are saying to yourself, "Well, it's all right if he does not keep this up too long." But he does keep it up. At 600 feet you think "It's about time we had some power, or else—." Suppose you now "voice your opinion"; by the time you have done so, and the captain has agreed and added power, it is too late.

All right, you may say, I would speak at 800 feet, but then the captain could very justifiably turn to you and say, "You let me fly this aeroplane, I'll decide when I want more power."

Further, although you are an experienced pilot by all proper standards, you may be less experienced than he, and you may not have flown with him before; you are therefore all the more prepared to give him the benefit of the doubt.

After all, what 1st officer has not mutely watched an approach and landing of which he has said to himself, "That seemed a bit unwise," but which has worked out all right in the end? There could be the odd case in which it did not work out.

I believe there are good reasons why a 1st officer might well not "voice his opinions." Incidentally, I cannot help chuckling at your euphemism. Would you really, on short final, on a rainy, bumpy night, with the windscreen wipers clattering like a train with square wheels, turn to the captain and say, "Sir, it seems to me that . . . ?" Far more likely it would be, "For ——'s sake open the throttles."

Everyone will agree with you that the co-pilot should be relieved of all duties during take-off and landing other than following the job in hand. Indeed, most of your readers who are familiar with the matter will agree that the 1st officer has very few distractions during final approach; all the pre-landing checks have been done, it only remains to flick on the final flap setting at the captain's command. A notable exception to this state of affairs is where no radio officer is carried, and there is only one radio compass, which has to be returned to the locator non-directional beacon after passing the main n.d.b. in-bound at some airfields; but I do not suppose this would arise very often. This leads me to say that I think your supposition that the co-pilot concerned in an avoidable accident must normally be otherwise engaged is of only limited validity.

More often than not the problem is one of human relations, together with the fact that there is only a hair-line between the potential and the irretrievable.

London Airport. 1ST OFFICER.

[Lest our correspondent's letter implies otherwise, we should make it clear that our leading article was not an expression of opinion on the Nutts Corner accident in particular, but on "pilot error" airline accidents in general.—ED.]

Centaurus Power Preferred

IN your issue of July 24th your contributor A. H. Yates states that I am said to keep in gliding practice "by 'thermalling' B.E.A.'s Elizabethans". Though obviously intended in the lighter vein, this statement is I feel, liable to misconstruction by readers not technically conversant with the intricacies of soaring flight.

I do not, of course, "thermal" Elizabethan aircraft, and in any conditions into which I should care to take my passengers I consider it a virtual impossibility. This does not mean that soaring flying cannot derive benefit from power flying, and *vice versa*. Undoubtedly the pilot who flies sailplanes and power can and should derive a fuller knowledge of his environment, with benefit to all his operations in it.

Farnham Common, Bucks. FRANK FOSTER.

A Tangmere History

AN attempt is being made to compile a history of Royal Air Force Station, Tangmere, and many former officers and airmen, and officers and airmen still serving, or who have at any time served on this station, will have in their possession photographs, combat reports, and other material which might find a place in it.

May I, through your columns, appeal to them for the loan of any material which they think might be of interest? I can assure them that the greatest care will be taken of any photographs, or other item which may be sent, and that it will be returned by registered post. Material should be addressed to the Officer Commanding, Royal Air Force, Tangmere, nr. Chichester, Sussex.

Royal Air Force, Tangmere. W. MACHENRY, F/L., for Officer Commanding.

FORTHCOMING EVENTS

Aug.	22.	A.T.A. Association : A.G.M. and Summer Reunion, White Waltham.
Aug.	22.	Coventry Air Day and Siddeley Challenge Trophy Race.
Aug.	29.	Vintage Aeroplane Club: Rally, White Waltham.
Aug.	30.	Aero-club d'Italia : Pescara Rally.
Sept.	3-5.	Chester Searchlight Tattoo (R.A.F. Night, Sept. 4).
Sept.	3-10.	Aéro-Club de Cannes : Cannes Grand Prix.
Sept.	6.	S.M.A.E.: "Yorkshire Evening News" Model Flying Festival, Sherburn-in-Elmet.
Sept.	7.	S.B.A.C. Farnborough Display and Exhibition : Technicians' Day.
Sept.	8-10.	S.B.A.C. Farnborough Display and Exhibition : Private Invitation Days.
Sept.	11-13.	S.B.A.C. Farnborough Display and Exhibition : Public Days (Public premiere, Friday, 11th).
Sept.	11.	Helicopter Association of Great Britain: Annual Dinner.
Sept.	12.	"At Home," R.N. Air Station Eglinton.
Sept.	14.	R.Ae.S. Wilbur Wright Memorial Lecture: "Structures," by Prof. N. J. Hoff, F.R.Ae.S., F.I.Ae.S.
Sept.	14-17.	R.Ae.S. and I.Ae.S.: Anglo-American Aeronautical Conference.
Sept.	15.	Battle of Britain Day.
Sept.	19.	"At Home," R.N. Air Station Abbotsinch.
Sept.	19.	R.A.F. At-Home Day.
Sept.	20.	St. Albans Model Aero Club : All-Britain Rally, Radlett.
Sept.	20.	Aero Club de Milan : Milan Grand Prix.
Sept.	24.	City of Coventry Freemen's Guild: Lecture "Development of Armstrong Siddeley Gas-turbine Engines," by W. H. Lindsey, M.A., F.R.Ae.S.
Oct.	8.	Start of England-Christchurch (N.Z.) Air Race.
Dec.	17.	Anniversary of the Wright Brothers' First Flight.

THE INDUSTRY

To Represent English Electric in U.S.A.

IT is announced that Mr. J. C. K. Shipp, B.Sc., A.F.R.Ae.S., M.I.Ae.S., has recently joined the English Electric Co., Ltd., in order to act as the group's aviation representative in the United States. After taking an honours degree in science at the University of Reading, Mr. Shipp joined the Airworthiness Department of the Royal Aircraft Establishment at Farnborough in 1936 as a technical assistant. In 1941 he moved to the Ministry of Aircraft Production as a senior scientific officer concerned with technical administration of American aircraft for the Royal Air Force, and he was subsequently a principal scientific officer engaged on research and development of Naval aircraft.

Mr. J. C. K. Shipp

In 1947 Mr. Shipp was appointed Head of the newly formed Department of Civil Aircraft Flight Testing, at the A. and A.E.E., Boscombe Down. Three years later he became West Coast representative of the British Joint Services Mission in America, where he carried out liaison duties with Air Force and Navy research establishments and aircraft and engine firms. His work also covered various aspects of guided-missile development. In 1952 he became Assistant Director of Technical Development (Plans) and Air Assistant for Standardization, NATO, in the Ministry of Supply.

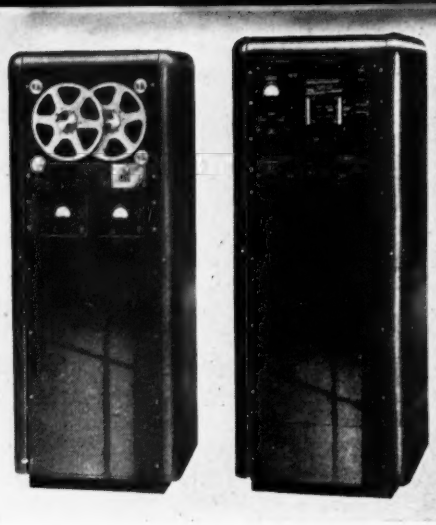
After a short period in this country to familiarize himself with the company's work—particularly its aviation activities—Mr. Shipp will be joining the English Electric staff in America.

Acid-Resistant Alloy

ALLOYS which are strongly resistant to corrosion by hydrochloric and phosphoric acids and, to a lesser extent, by sulphuric acid can be produced by adding molybdenum to nickel or to nickel containing a small percentage of iron. Early work on such alloys was done in the U.S.A. and Germany, and castings have been produced in this country for some years. Now comes news that a wrought form has been produced by Henry Wiggin and Co., Ltd., Birmingham, under the trade name of "Corronel B".

It is stated that previous work on nickel-molybdenum compositions, supplemented by investigations carried out by the company, show that corrosion-resistance improves with increased molybdenum content, and that additions of up to 10 per cent of iron at the 30 per cent molybdenum level have no significant influence on corrosion rates. The composition of "Corronel B" is approximately 66 per cent nickel, 28 per cent molybdenum and 6 per cent iron.

The new alloy can be satisfactorily worked, although it offers greater resistance to deformation than mild and low-alloy steels. "Corronel B" is highly resistant to hydrochloric acid at all concentrations and temperatures, and has excellent resistance to sulphuric and phosphoric acids in certain ranges of concentration.



The Simon long-duration tape monitor, Type LDT-7, described below. On the right is the time-injector unit which may be used in conjunction with the monitor.

For Monitoring Communications

THE Simon long-duration tape monitor (Type LDT 7), shown in the accompanying illustration, has been designed to provide long-duration monitoring, with devices to preserve the security of the recorded intelligence, at low initial outlay and small running costs. The unit records two channels simultaneously, with a duration of four hours, on one 2,400ft spool of standard ¼in tape, and incorporates facilities for immediate monitoring and replay. Voice-operated start/stop is a "switchable" alternative to continuous running. A locating mechanism, calibrated in minutes, operates on the normal speed of forward and on the fast speeds of forward and rewind. The LDT 7 will accept timing signals from the Simon time-injector unit (type TIU 3), also illustrated above.

These recorders—a product of Simon Equipment, Ltd., Recorder House, 48-50 George Street, Portman Square, London, W.1—have the additional advantage that installations may be built up two channels at a time, as required, with standard units.

IN BRIEF

Entitled *Aluminium Panorama*, a magnificently produced 126-page (8¼in x 11in) brochure on the history, characteristics, production and distribution of the metal named has been published by Aluminium, Ltd., Montreal, Canada. It is illustrated with some hundreds of photographs and drawings, many in colour.

* * *

Birmid Industries, Ltd., announce the retirement of Mr. Frank G. Woollard from the Boards of the Birmingham Aluminium Casting (1903), Ltd., and the Midland Motor Cylinder Co., Ltd., with whom he has been associated as a director for 17 years. He is to continue his consulting and educational activities.

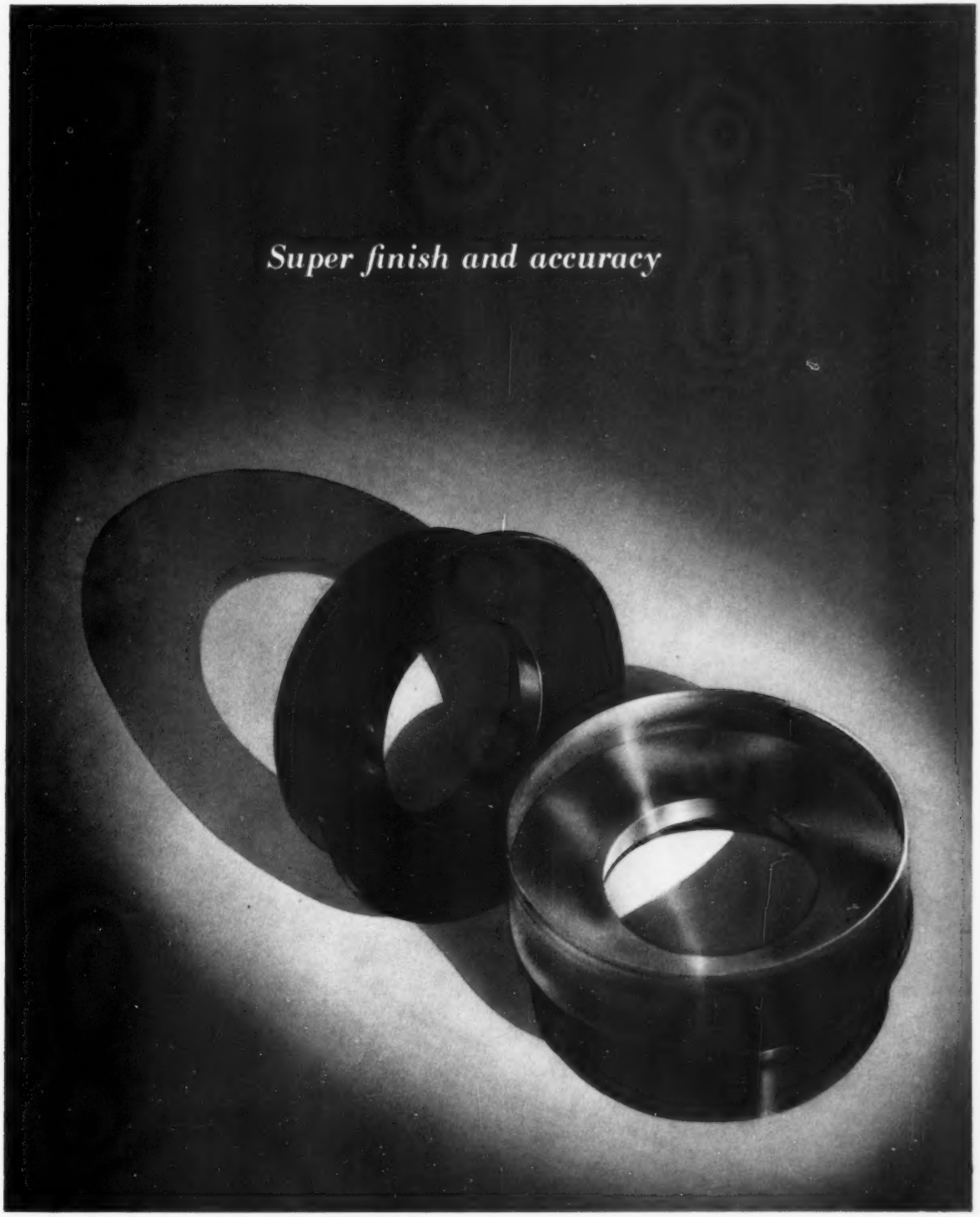
* * *

From the Midland Motor Cylinder Co., Ltd., comes news that Mr. Edward Player, managing director of Birmid Industries, Ltd., their parent company, has joined their Board. Mr. Harold H. Hopkins and Mr. Robert S. Waterhouse have also been appointed directors. Mr. Hopkins has been sales manager of the company for 28 years and Mr. Waterhouse the chief buyer for 32 years.

* * *

Of considerable value to fabricators of reinforced glass-fibre plastics will be the *Polyester Handbook*, lately published by Scott Bader and Co., Ltd., 109 Kingsway, London, W.C.2, makers of synthetic resins and other industrial raw materials. The 68-page booklet contains a number of hints and formulæ which, it is believed, have not previously been published in this country.

"SKY SHOUTING" is the term applied to the dissemination of spoken propaganda or warnings from the air: an effective weapon of modern warfare. This A.O.P. Mk 6 Auster is on test with two extra-powerful 100-watt loudspeakers. Like that used in Valettas in Malaya ("Flight," August 7th), the equipment has been developed by Tannoy Products, Ltd., of London.



No. 7. The optical maker's art applied in producing camplates for high-pressure fuel pumps.

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LUCAS

JOSEPH LUCAS (Gas Turbine Equipment) LTD. BIRMINGHAM AND BURNLEY

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Contributions to the

AIR FORCES OF EUROPE

are the Royal Navy's foremost strike-fighter the Westland "Wyvern" with Armstrong Siddeley Python turbo-prop engine and Rotol contra-rotating propellers, backed with the Westland S.51 and S.55 helicopters in their search, life saving, and transport roles and now in service with the Army, Navy and Air Forces throughout the world.

WESTLAND AIRCRAFT LIMITED · YEOVIL · ENGLAND

NEW B.E.A. LINE? British European Airways are seriously considering the advantages of a proposal to operate Bristol 171 helicopters between Waterloo Air Terminal and London Airport. The helicopters would be equipped with floats for emergency landings on the Thames. This topical study is of a military Bristol Sycamore over the L.A.P. terminal area.

"Flight" photograph

CIVIL AVIATION

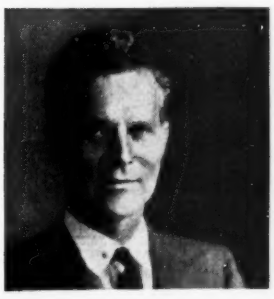
G.C.A. ACCIDENT REPORT

WHILE making a ground-controlled approach to the R.A.F. airfield at Lyneham on November 27th last year, a Surrey Flying Services York (operated by Air Charter, Ltd.), descended some 140 yd short of the touch-down point and was severely damaged. Captain A. P. Lane and two of his crew of four were slightly injured. The results of an official M.C.A. inquiry into the accident were announced on August 17th and will be published by H.M.S.O. in printed form in a few weeks' time.

The report states that the last instruction given by the talk-down controller was "quarter mile—left 3 deg, clear to land, talk-down out." Although visibility was given as 600 yd, the captain and first officer could not see any approach lights and continued to fly on instruments. The first officer then saw trees 50 to 100 yd ahead and shouted a warning to the captain, and both pulled back on the control column. However, the aircraft flew through the tree tops and struck a ridge of steeply sloping ground. In the opinion of the official investigators the accident occurred as a result of the captain allowing the aircraft to descend below critical height during a ground-controlled approach without having visual reference to the ground, contributory causes being:—(1) The captain was not warned by the talk-down controller that the aircraft was approaching break-off altitude; (2) the visibility at the threshold of Runway 07 was less than the airfield visibility which had been reported to the captain; (3) the aircraft was affected by a down-draught which caused it to sink below the glidepath. The glidepath at Lyneham allows for less obstacle clearance than is normal with a civil installation.

The report makes the following recommendations: That the R.A.F. should ensure (1) that the Q.F.E. values refer to either the published airfield altitude, or the touch-down altitude for the runway in use; (2) the advisability of increasing the break-off altitude (obstacle clearance limit) for ground controlled approaches to Runway 07 at Lyneham; (3) the use of the civil system of reporting runway visual range; (4) that the attention of pilots is drawn to (a) their responsibilities with regard to critical height; (b) the necessity for systematic flight instrument scanning during instrument approaches; (c) the need for systematic pre-arranged co-operation between the first and second pilots during the transition stage from instrument to visual conditions.

[The first officer's action, which may well have reduced the severity of the accident, and recommendation (*c*) above, are of particular interest in view of *Flight* leading article of July 31st.]



M.C.A. RETIREMENT: When the Ministries of Transport and Civil Aviation are amalgamated in October, Sir Arnold Overton (left) will retire from his appointment as Permanent Secretary to the M.C.A., which he has held since 1947, having reached the age of 60. His duties will be taken over by the Permanent Secretary of the combined Ministry, Sir Gilmour Jenkins, who has held a similar post with the Ministry of Transport for the last six years.

ONE FORM FEWER

ON and after August 31st captains of mail-carrying aircraft arriving in the U.K. will no longer have to "solemnly declare that . . . I have delivered or caused to be delivered to a proper Office of the Post Office every postal packet and every mail bag, package or parcel of postal packets that was on board the above-mentioned aircraft . . ." The abolition of this declaration, thus reducing by one the number of documents to be completed by commercial pilots, has been made possible by a new Act of Parliament, following representations by the M.C.A.

MOVING BY AIR

SOME surprise has been expressed at the report (*Flight*, July 31st) that an Aer Lingus Freighter moved an entire household, consisting of a family of five and furniture, weighing just under 4 tons, from Dublin to London at a cost of £100. Reference to the list of cargo rates published by the airline, however, shows that household furniture is carried on this route on a scheduled service at 7d per kg for a minimum of 500 kg. On this basis the cost of transportation of four short tons from Dublin to London would be about £105; and in the case mentioned in our report the customer was a member of an airline associated with Aer Lingus who was changing his address for professional reasons, and who therefore received a slight concession in rates. These figures refer only to the cost of moving from one airport to another and the total cost would be increased by surface charges.

B.O.A.C. FLEET NEWS

BY acquiring the Series 1A Comet originally ordered by C.P.A., B.O.A.C. have replaced the aircraft lost near Calcutta last May. The loss of one of two Comets ordered by C.P.A. (while making a delivery flight) made it impossible for the Canadian airline to run its projected jet service between Sydney and Honolulu. B.O.A.C. took delivery of the remaining aircraft on August 10th, and within two days it had been repainted in Corporation colours. Its registration, formerly CF-CUM, is now G-ANAV. The aircraft is being virtually converted to a standard B.O.A.C. Series 1 Comet by removal of extra tanks and water-injection equipment, modifications to radio and alterations to the passenger cabin (the number of seats will be reduced from 44 to 36); it should enter service within a few days.

One of the two weekly Comet services to Tokyo was suspended

WELL-PLANNED: The new airport at Shreveport, Louisiana, is a fine example of modern U.S. terminal design. The building is situated in the angle formed by two runways (6,400ft and 4,800ft); the covered walk ("concourse") for passengers extends 350ft into the centre of the marshalling apron.

CIVIL AVIATION . . .

last week and an extra Argonaut flight put on in its place. Lack of traffic was given as the reason (the Argonauts fly a different route *via* Hong Kong). This move, however, should make it easier for the hard-pressed Comet Fleet to fulfil all its commitments. Until the delivery of the C.P.A. Comet, the aircraft strength, already depleted, was temporarily further reduced to six by a taxying incident at Karachi, when one of the aircraft became bogged down while taxying after heavy rain.

Plans are also announced for operating services flown by the Hermes fleet, which (as recent advertisements in *Flight* have indicated) are being offered for sale. From October, Argonauts will take over all the Hermes services between the United Kingdom and East Africa. Fitted with 40 or 54 seats, they will operate, respectively, both first-class and tourist services. These aircraft are also operating five extra transatlantic return flights—four to Montreal and one to New York—during August, supplementing the twelve regular tourist services flown each week by 65-seater Constellations.

ANGLO-PHILIPPINE AGREEMENT DENOUNCED

REFUSAL by the Philippine Government to allow full local traffic rights to B.O.A.C.'s Comet service to Tokyo brought repercussions last week, when the M.C.A. announced that "Following inconclusive negotiations over a long period for the amendment of the Philippine-United Kingdom Air Services Agreement, the United Kingdom has now given the Philippines formal notification of the termination of the Agreement." As reported on page 235, the frequency of Comet services to Tokyo has now been halved. The M.C.A. statement continues: "This notification was given in accordance with the provisions of Article 13 of the Agreement and will have effect twelve months from the date on which the Philippine Government received the Note. The principal effect of this will be that, unless in the meantime a new Agreement has been negotiated as we hope, Philippine operators will be unable at the end of the twelve month period to exercise traffic rights at points in United Kingdom territory, and on the other side United Kingdom and colonial operators will be unable to exercise traffic rights in the Philippines."

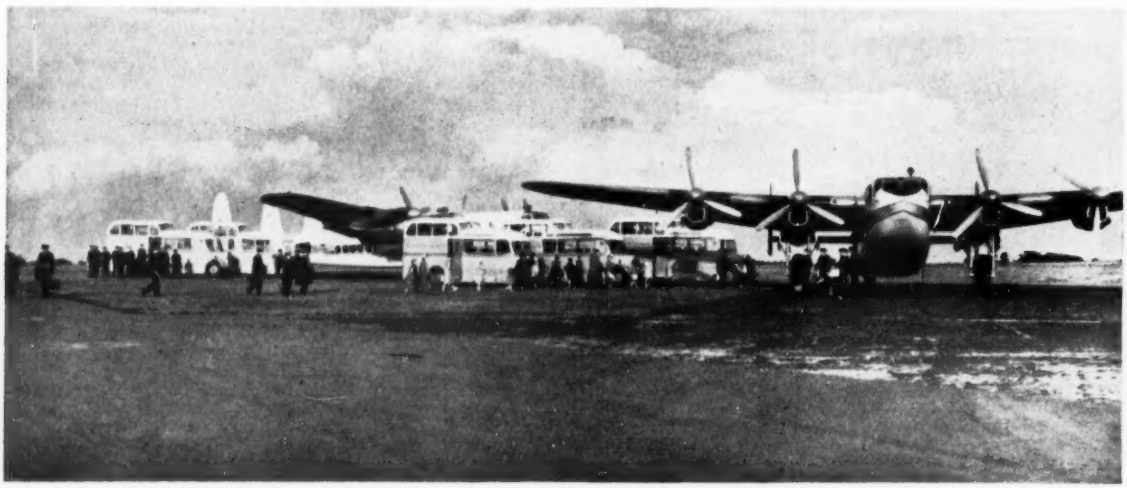
The Philippines are claimed to have the balance of advantage in regional routes and the right to operate a route to London and beyond; thus the agreement is generally very much in their favour. The United Kingdom Government take the view that, in accordance with the principle of reciprocity normally underlying agreements of this kind, full traffic rights at Manila should be given to B.O.A.C. on their Comet service. However, the Philippine Government were only prepared to concede traffic rights on a temporary basis and with severe limitations on the exercise of rights between Manila and Europe and between Manila and Tokyo. The United Kingdom Government found these limitations unacceptable and have accordingly decided to terminate the Agreement with a view to the negotiation of a new one at an early date.

In protest against the Philippine action, some of B.O.A.C.'s engineering staff decided not to work on Philippine Air Lines aircraft turning-round at London Airport. The idea was dropped after discussions between union representatives and members of B.O.A.C. management. Philippine officials, acknowledging receipt of the British decision, pointed out that their Manila-London service has traffic rights at Madrid but not at Zurich, Hamburg or Rome.

AUSTRALIAN PILOT'S VIEWPOINT

FOLLOWING a visit to America, where he was a guest of the Air Safety Forum of the American Air Pilots' Association, Captain R. Andrews has suggested that the Australian Air Pilots' Association, of which he is president, should form similar sub-committees to study accident prevention. To illustrate the American approach to safety problems, he mentioned the case of one such committee formed by the American association which devoted its attention to cockpit procedure; it was calculated that in consulting a flight plan at night a pilot made seven movements and spent 13 sec. The sub-committee designed a lighted flight plan holder which needed no movements and occupied only three seconds. Captain Andrews also advocated that his association should be represented at all official accident inquiries held by the Australian Department of Civil Aviation. He further contended that the chairman at such inquiries should be a pilot guided by a legal man rather than a legal man guided by a pilot. He argued that as professional men Australian airline pilots would be the last to attempt to cover up any evidence that proved indisputably that an accident had been caused by carelessness or unprofessional behaviour. On the other hand, pilots had a duty to the public they carried, and to themselves, to see that they did not fill the role of scapegoat simply because they lacked the standing to prevent it.

TROOPSHIPS: Busy scene at Stansted, main base of Skyways, Ltd., which has a fleet of 28 Yorks employed largely on War Office trooping contracts. Troops are seen embarking and disembarking against a background of Yorks and new Skyways coaches recently acquired from B.O.A.C.



LINKING CITIES AND PORTS: This dapper Dove is one of a fleet operated by Cambrian Air Services from Cardiff and Bristol to Paris, Guernsey, Jersey, Liverpool and Southampton. Other C.A.S. services originate at Liverpool.
"Flight" photograph

BREVITIES

JULY was a record month for B.O.A.C., who carried 23,140 passengers during the month, compared with 20,471 in July, 1952.

* * *

Another new B.O.A.C. sales office has been opened in America. Mr. F. J. Pinchen is in charge of the new centre, which is situated in San Francisco, and will also handle bookings for B.O.A.C.'s associate and subsidiary airlines.

* * *

Under the present civil-aviation policy, the Corporations are not permitted to maintain aircraft solely for charter work. During the coming winter, however, B.O.A.C.'s Stratocruisers and Constellations will not be fully engaged on normal passenger services; the Corporation has announced that they will on occasions be available for charter and special flights on the North Atlantic route.

Operations of India's two new State-owned airlines (one domestic, the other international) were formally inaugurated at Safdarjang Airport, New Delhi, on August 1st. The first aircraft, a Viking, was dispatched with due ceremony by the Indian Prime Minister, Mr. Nehru.

* * *

A turboprop version of the Douglas DC-7, designated DC-9 and powered by four Pratt and Whitney T-34s, is reported to be under development.

* * *

Over 100 Swedish pigs were due to be flown from Malmo to Cambridge earlier this week in Bristol Freighters of Silver City Airways and Dakotas of B.K.S. Aerocharter. The animals were being imported for breeding purposes by the National Pig Breeders' Association, and were to be carried in special pens—28 per Freighter and 12 in each Dakota.

FROM THE CLUBS

FLIGHTS of up to two hours' duration (with no diversion airfields) in an aircraft having an endurance of only 2¼ hours were features of a recent flight to Sabadell, Spain, made by two members of the Midland Aero Club, Elmdon. Pilot and co-pilot were Mr. J. M. Pashley and Mr. A. M. Harris, flying in Mr. Pashley's Taylorcraft Plus D, and the flight was accomplished in nine stages.

A GEMINI has recently been added to the fleet of the Yorkshire Aeroplane Club, and is soon to be fitted with dual control. Another Sherburn attraction, for ground-based members, is a clay-pigeon shooting range. The training of A.T.C. cadets continues apace, and the club's July total was 177 hours.

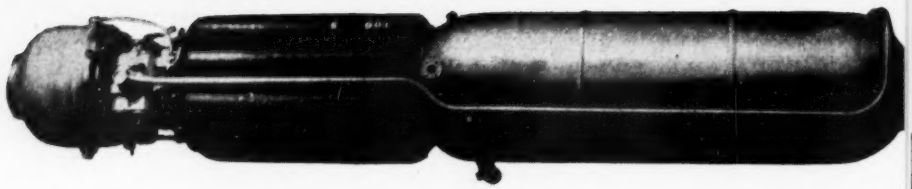
HEADING the list of pilots qualifying for the British Air Racing Championship is S/L. James Rush, who is a good example of a company director combining flying for his firm with racing his aircraft in this country's various sporting events. Most of Jimmie Rush's time is devoted to the interests of his business (a Newcastle-on-Tyne glassware company) but by competing consistently in the national air races he has gained 53 points towards the championship, six more than his nearest rivals, Ron Paine and Walter Bowles, each of whom has 47 points.

The deciding race is that for the Siddeley Challenge Trophy, to be flown at Baginton Airfield, Coventry, tomorrow, when Rush will fly his Falcon Six as a representative of the Vintage Aeroplane Club. He finished fourth in the Goodyear Trophy, Welsh Air Derby and King's Cup, and second in the Kemsley race, showing just that consistently high standard of racing which the Royal Aero Club's system of points is intended to recognize.

PERTH Aerodrome attracts many holiday-making pilots from clubs in other parts of the country and abroad each year, and many such visitors—including a number from the Paris Aero Club—have been welcomed by the host club—the Strathtay Aero Club—this season. July's flying time amounted to 170 hours, and in spite of bad weather five P.P.L.s were obtained.

TRANS-CANADA AIR TOUR: Some 80 light aircraft recently flew from Lethbridge, Alberta, to Yarmouth, Nova Scotia, in a 7,000-mile tour sponsored by the Royal Canadian Flying Clubs Association. A number of the participating aircraft are pictured here during one of the halts.

TOPPING UP the tanks of his Miles Falcon Six is S/L. Jimmie Rush (right) making final preparations for the last Aero Club race of the year, the Siddeley Trophy, to be flown at Coventry tomorrow. A list of entrants appears on page 215 of this issue.



Those familiar with the Sprite will observe the greatly increased length of the new motor.

ENGINES IN THE NEWS

D.H. SUPER SPRITE

THE existence of a new de Havilland assisted-take-off rocket motor—intended, in the first place at any rate, for military application—is revealed today. Known as the Super Sprite, the new unit follows a constructional layout generally similar to that of the well-known Sprite, but is considerably greater in overall length and shows a departure from the simple monopropellant system of the smaller motor.

It gives more than double the total impulse of the Sprite—12,000 lb sec as against 55,000 lb sec; maximum thrust is reduced from 5,000 to 4,000 lb, but duration has been increased from 12 sec to 40 sec.

The existing Sprite is, of course, a so-called "cold" motor. A potassium permanganate solution serves as a catalytic agent for the purely chemical dissociation of the hydrogen peroxide propellant. The reaction produces superheated steam and oxygen, which are discharged as a high velocity jet to produce the propulsive thrust. There is no combustion in the accepted sense.

In the new motor the same principle is employed to provide the major portion of the thrust, with the difference that a solid catalyst (the nature of which is not yet disclosed) is used instead of the fluid potassium permanganate.

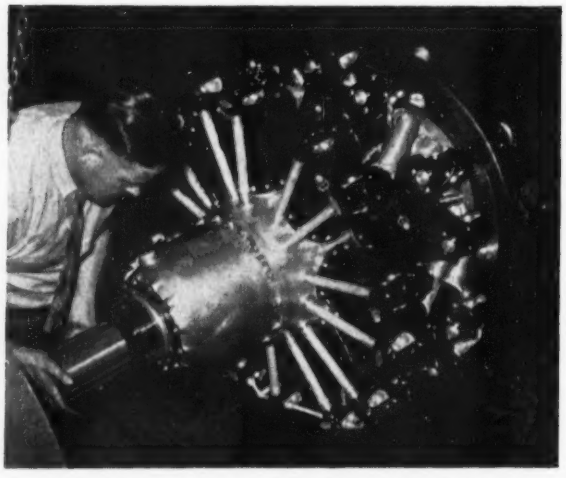
The presence of free oxygen in the effluent, however, makes possible the burning of liquid fuel, to add heat to the jet (and consequently to add to its velocity) in the manner of an afterburner in a turbojet. An injection of gasoline or kerosine is employed for this purpose in the Super Sprite.

The introduction of the solid catalyst eliminates the need for a separate permanganate tank and allows simplification of design and greater ease of handling. It also has the advantage of eliminating the "brown steam" exhaust of rockets using permanganate; the exhaust jet of the new unit is said to be completely smokeless.

The kerosine or petrol used in the Super Sprite is drawn from the main tanks of the aircraft, and it is this factor which dictates the choice between the alternative fuels, both of which are equally suitable for the rocket. Hydrogen peroxide, state de Havillands, has a marked advantage over many fluids commonly used in rocket propulsion, in that it is safe and relatively easy to handle and has good long-storage characteristics.

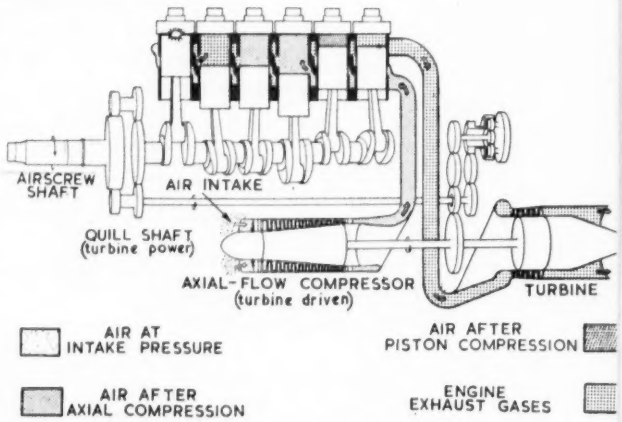
TWO-ROW LEONIDES

NEWS is received as we go to press of the successful first run of the Alvis Leonides Major, a new two-row 14-cylinder engine, developed primarily for the Westland-Sikorsky S.55—although many other applications both for helicopters and for fixed-wing aircraft are foreseen. The unit is designed to give 870 h.p., and an example of the installation in the S.55 will, it is hoped, be shown statically at Farnborough.



The Alvis Leonides Major on the test-bed for the first time.

NOMAD NNm.6

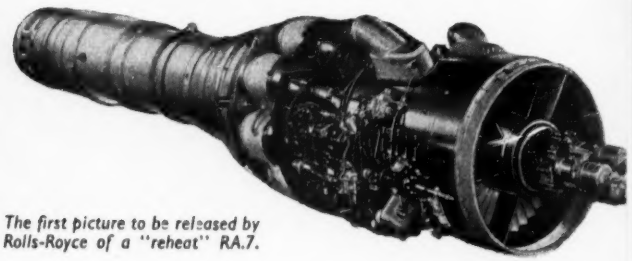


Air- and gas-flow diagram for the Nomad. The reciprocating unit is a twelve-cylinder opposed two-stroke C.I. engine.

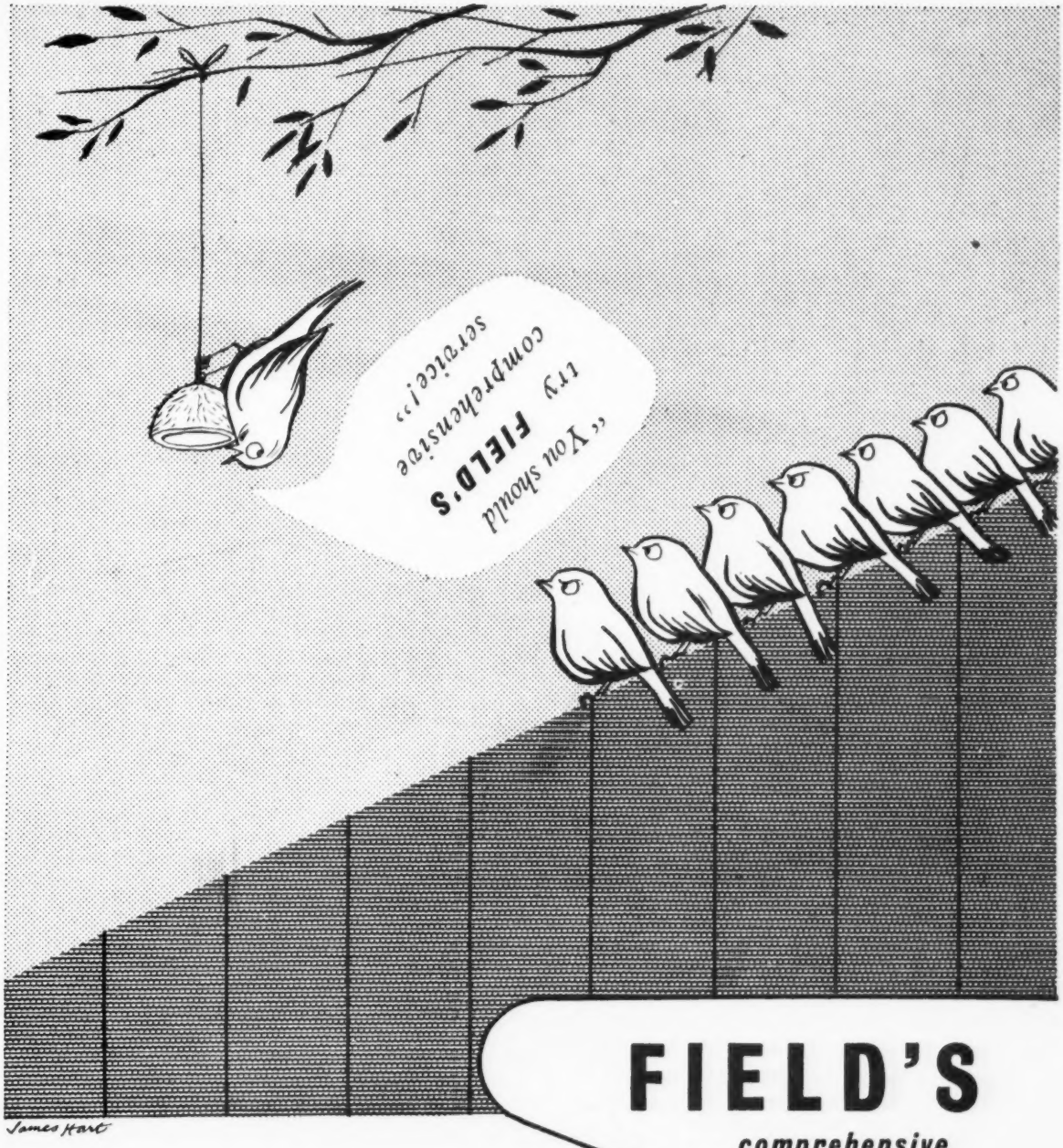
AN important Napier exhibit at the forthcoming S.B.A.C. Exhibition will be the latest Nomad NNm.6. Many features have still to be revealed by the makers but the above air- and gas-flow diagram, which applies to all recent marks of Nomad, will help those who have not studied this unique compounded engine to appreciate its working principle. Weight figure released for the Nomad is 3,550 lb, the power rating 3135 e.h.p. and the specific consumption about 0.33 lb/e.h.p./hr.

AVON RA.7 WITH REHEAT

A PHOTOGRAPH of the 9,500 lb Avon RA.14 together with brief data were recently released, and now it is possible to mention another mark of Avon—the RA.7R, which, with reheat, gives the same power as the 14, namely, 9,500 lb thrust. The first photograph of this unit which passed its type test in January is reproduced here. The RA.7 from which the engine is derived is rated at 7,500 lb thrust and has a specific consumption of 0.92 lb/hr/lb. The length of this engine without reheat jet-pipe is 82.2in and the diameter 42.225in. The dry weight is 2,460 lb and the addition of reheat adds 500 lb to this figure. For comparison the RA.14, which, around the combustion area and compressor casing, is markedly different in appearance from the RA.7, weighs 2,860 lb, has a length of 77.45in and a diameter of 41.5in. It is understood that the earlier RA.3 of 6,500 lb thrust may soon be up-rated by 500 or 600 pounds without appreciable alteration to components as a result of the satisfactory and very considerable experience that manufacturers and the R.A.F have had with this unit. Very similar Avons were used in the Comet 2.



The first picture to be released by Rolls-Royce of a "reheat" RA.7.



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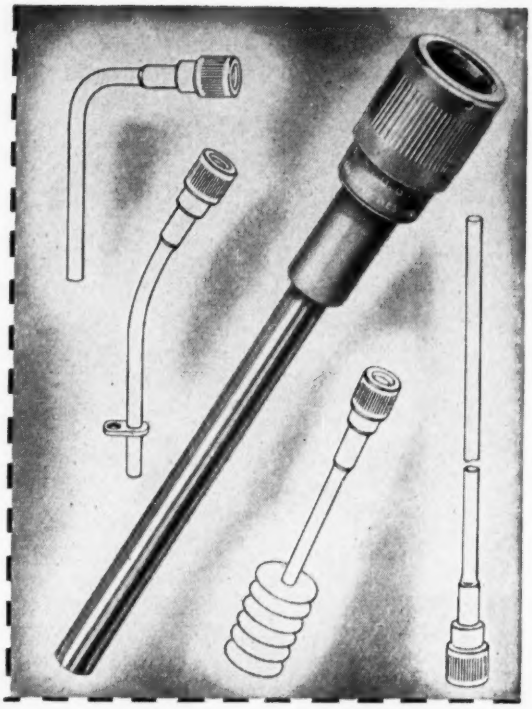

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SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

R.A.F. Appointments

AFTER commanding the R.A.F. Staff College at Bracknell, Berkshire, since June 1951, A.V-M. A. D. Gillmore, C.B.E., is to become Senior Air Staff Officer, Far East Air Force. His place at the Staff College will be taken over by A. Cdre. C. E. Chilton, C.B., C.B.E., who, since February last year, has been A.O.C. Gibraltar.

It is announced also that A. Cdre. C. W. Gore, O.B.E., who has been Air Ministry Director of Equipment (A) at Harrogate since last March, is to become Director of Mechanical Transport and Marine Craft at the Air Ministry, with effect from August 31st. Another appointment effective on the same date is that of A. Cdre. A. M. Rodgers, who will relinquish a post with the Plans and Policy Division, AAFCE to take command of the Central Signals Establishment. The present holder of this post, A. Cdre. G. H. Randle, is to be Director of Signals (2) at the Air Ministry from September. He will succeed A. Cdre. V. G. A. Hatcher, O.B.E., A.F.C., who will become Senior Technical Staff Officer, F.E.A.F., in November.

Two signals appointments are those of A. Cdre. T. U. C. Shirley, C.B.E., who becomes Command Signals Officer at Fighter Command, and A. Cdre. M. Watson, C.B., C.B.E., who leaves Fighter Command and becomes Director of Signals (1) at the Air Ministry.

Ferrying the Sabres

SOME 30 pilots of R.A.F. Transport Command are now engaged in ferrying Canadair-built F-86 Sabres from Montreal to the United Kingdom. The Sabres are flown over in groups of thirty, each divided into six flights of five. The journey is made in four stages: Montreal to Goose Bay, Labrador; Goose Bay to Bluie West, Greenland; Bluie West to Keflavik, Iceland and Keflavik to the U.K.

Three different types of flying clothing are worn during the journey: arctic kit over Labrador, immersion suits for the sea crossings, and normal overalls for final deliveries in the U.K. The immersion suits, though waterproof, are made of a special porous material which allows the suit to "breathe" in the air; immediately on immersion the suit seals itself and becomes buoyant.

Pilots completed survival training before the delivery flights began. For arctic survival practice they had to subsist individually for two days in the wilds, some 80 miles from Quebec, in a temperature of 20 degrees below zero. They were clad in parkas and special boots and for sustenance carried one oatmeal block, two meat blocks, one packet of chicken noodles, cocoa powder, tea and sugar.

Familiarity with the immersion suits was gained in the chilly waters of a Greenland fjord, in which each pilot was left to float for over an hour.

After each ferrying flight, transport aircraft return the pilots to Montreal for the next batch of Sabres.

ALL WEATHER, OVER WEATHER: A Russell Adams impression of what fighter pilots of the future will see when flying "in the box" of a Gloster Javelin formation. The planform of the latest Javelin is shown on page 225.

Rear-Admiral Pedder

A RECENT naval promotion is that of Capt. A. R. Pedder to the rank of Rear-Admiral. Admiral Pedder entered the Royal Navy in 1918 and qualified as a naval observer in the Fleet Air Arm in 1930; at the same time he took his civilian "A" pilot's licence. In 1937 he received his promotion to commander whilst serving in the old carrier *Eagle*.

At the outbreak of war in 1939 he was serving in the Naval Air Division at the Admiralty, where except for a period at sea in H.M.S. *Mauritius*, he stayed unti going to Plans Division—becoming Assistant Director of Plans (Air) in 1944. The following year he was at sea again, commanding the escort carrier *Khedive* in South East Asia.

He is now Assistant Chief of Naval Staff (W).

Exercise "Mariner"

THERE is to be a major NATO sea-air exercise in the North Atlantic under the code name "Mariner"; it will last for 19 days from September 16th and will be staged by nine of the 14 NATO nations. For the first time the three principal NATO area commands—Supreme Allied Command Atlantic, Supreme Allied Command Europe and Channel and Southern North Sea Command—will work jointly. Forces from Belgium, Canada, Denmark, France, the Netherlands, Norway, Portugal, the United Kingdom and the United States will be exercised in one or more phases of applied sea/air power.

"Mariner" will be directed by Admiral L. D. McCormick, U.S.N. (SACLANT), Gen. A. M. Gruenther, U.S.A. (SACEUR), Admiral Sir John Edelsten, R.N. (C-in-C. CHAN) and Air Marshal Sir Alick Stevens, R.A.F., Allied Air Commander-in-Chief Channel (CINCMAIRCHAN).

R.A.F. Marksmen at Bisley

IN the 1953 Pistol Championship of the National Small-Bore Rifle Association, R.A.F. marksmen won five of the seven challenge cups put up for competition.

W/C. R. F. B. Guy, of Headquarters Training Command, won four, including the J. K. Gallie Cup for the championship of Great Britain, and S/L. C. C. Willott won the fifth. For the championship W/C. Guy scored 268 points out of a possible 300, beating D. G. Treble, who was second, by only one point. S/L. Willott's win was the British Silhouette Champion-

NEW SQUADRON EQUIPMENT: A unique "Flight" photograph of F.1 (Avon) and F.2 (Sapphire) Hunters, which are the next fighters to go into squadron service. No announcement has been made as to which is to be the fortunate "first" squadron of these or the Javelin above.

SERVICE AVIATION . . .

ship, with 30 hits giving a total of 286 points out of 300. Capt. V. H. Viney, British Army, was second.

A.O.C. No. 11 Group

THE successor to A.V-M. the Earl of Bandon as A.O.C. No. 11 Group is to be A.V-M. H. L. Patch, C.B., C.B.E., who will take over command in November next. For the past twelve months A.V-M. Patch has been S.A.S.O. Far East Air Force.

A typographical error last week made it appear that the Earl of Bandon's new appointment was as R.A.F. Instructor at the Imperial Defence College. Correctly, he is to be Assistant Chief of the Air Staff (Training) at the Air Ministry and will take up his new duties in October.

The Wallis Foundation

A BADGE has been designed by Mr. E. Roland Bevan to be worn by Royal Air Force Foundationers at Christ's Hospital. The foundation was made by Dr. B. N. Wallis with the £10,000 he was awarded for his design of the weapon with which No. 617 Squadron breached the Möhne and Eder dams; the R.A.F. Benevolent fund contributed a further £10,000. The emblem is based on the crest of No. 617 Squadron, and the Latin quotation recalls a stanza from an ode by Horace on Icarus. The badge will be worn on the traditional blue coat.

Aircrew-hearing Research

RESEARCH into the extent, if any, to which the hearing of aircrew may be impaired during long flights is to be intensified by the acoustics laboratory of the Central Medical Establishment of the R.A.F., which has developed and will shortly put into use the first mobile otological research unit.

The possibility that the noise of modern aircraft, especially jets, may affect the hearing of aircrew has long been investigated in static laboratories. Now, with the new mobile unit, medical officers will, for the first time, be able to test aircrews' hearing within a few moments of their stepping from their aircraft, instead of after a lapse of time. The mobile unit will await the landing of aircraft, and start hearing tests within a minute of an aircraft touching-down. It will enable a man's hearing to be tested immediately before take-off, and provide a comparison with his hearing after the flight.

Construction of the mobile unit has been carried out under the supervision of E. D. D. Dickson, C.B., C.B.E., M.D., F.R.C.S., Q.H.S., Consultant in Otorhinolaryngology to the R.A.F., and Mr. L. J. Wheeler of the acoustics laboratory.

A seven-ton Bedford truck chassis carries the mobile unit, which is completely self-contained, and consists of a triple-walled, soundproof chamber and an ante-chamber. Power for all purposes is supplied from the vehicle itself. The ante-chamber serves as a clinical examination room, and hearing tests, by audiometry, can be carried out in the soundproof chamber under controlled conditions wherever the unit is situated. Hitherto, aircrew have had their post-flight hearing tested by audiometer in some convenient room perhaps 10 or 15 minutes away from the tarmac. This time interval has prevented a true picture of their post-flight condition being obtained. Should on-the-spot tests show that a man's hearing has deteriorated during the flight, periodical tests will subsequently be made in laboratories to determine how long such deterioration lasts.

The new unit will be shown for the first time at Farnborough on September 8th, during the meeting there of the Aero Medical Panel of the Advisory Group for Aeronautical Research and Development of NATO. Delegates to the meeting from European NATO countries will inspect it.

The crew of the unit will consist of one medical officer trained in otorhinolaryngology, and a driver. It will carry out its first tests later in September at R.A.F. Station St. Eval, with aircrew of Coastal Command Shackletons.

WINNERS: The team from the Empire Test Pilots' School which won the team championship at the recent National Gliding Championships: Left to right, F/L. J. D. Price, F/L. E. C. Rigg, P. L. Bisgood and S/L. C. H. Macfie.

MOMENTOUS VISITOR: The Earl of Limerick, second from left, visited Biggin Hill during exercise "Momentum" last Sunday. With him are W/C. D. G. Smallwood (Station Commander), G/C. E. J. Davis, F/L. R. G. Shillingford, A. Cdre. R. Spaight, and S/L. N. Curtis. The Earl of Limerick is chairman of the Council of Territorial and Auxiliary Forces Associations.

"Flight" photograph

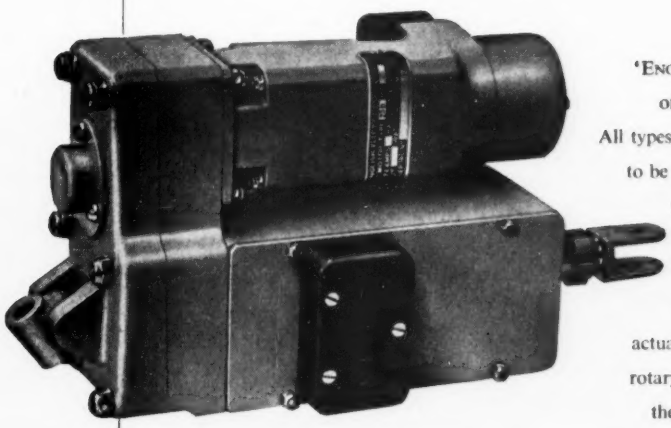
Exercise DXM (1953)

THE sea, land and air defences of Malta were tested in exercise DXM (1953) which lasted from August 11th to 15th. Torpedo-boat attacks on the naval harbour were heavily countered by harbour artillery and low level air strikes on Valetta were intercepted by land-based fighters. U.S. Marines established a beach-head in Mellieha Bay and were then engaged by No. 40 Royal Marine Commando, who called in air and artillery support. The exercise was carried out with great vigour.

Units taking part were drawn from the British Army, the R.A.F., R.A.A.F., R.N.Z.A.F., the Royal Navy, No. 3 Commando Brigade, R.M., U.S. 6th Fleet and U.S. Marines, as well as Malta's police force, Civil Defence organization, and the Royal Malta Artillery.

Fleet Air Arm S.S. Commissions

THE age limit for the commencement of short-service commissions in the Fleet Air Arm has been raised to 26 by a decision of the Board of Admiralty; the previous limit was 24. Some 20 per cent of those accepted under this scheme are offered permanent commissions during their eight years' service, and officers who do not take a permanent commission, or who are not selected for one, receive a gratuity of £1,500 at the end of their service



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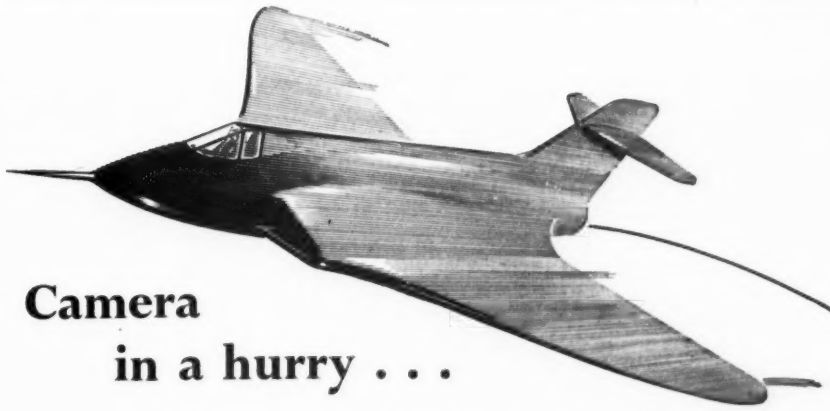

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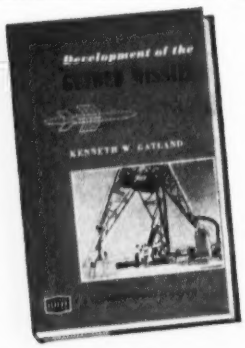

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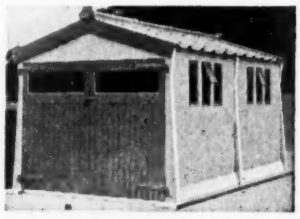

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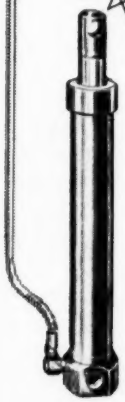

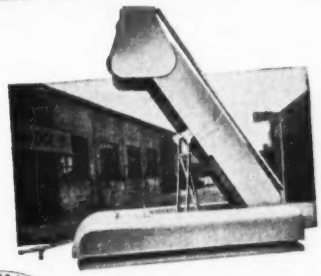

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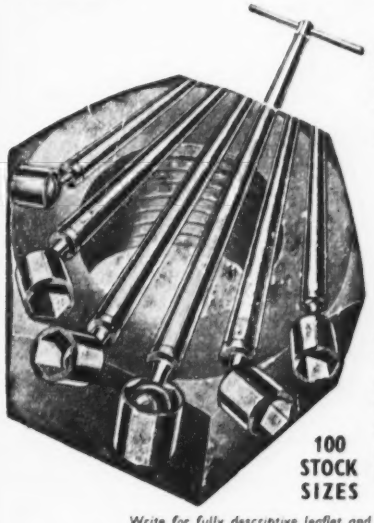

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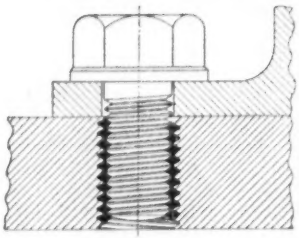

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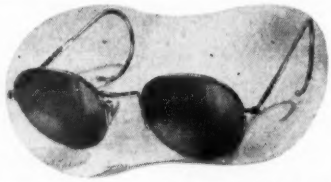

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WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109 Jermyn St., London S.W.1. Tel.: Whitehall 8863. [0419

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THORNTON.—On August 6th, 1953, very suddenly, Arthur James Thornton (Mic), F.C.S., A.F.R.Ae.S., beloved husband of Ivy, 6 Sandal Road, New Malden. Elder son of the late James A. and Eleanor J. Thornton. [9942

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THE Air Transport Advisory Council give notice that they have received the undermentioned application to operate a scheduled air service:—

Application No. 209. From British Overseas Airways Corporation of Airways House, Great West Road, Brentford, Middx, to include, for the maximum period, Baghdad as an alternative to Basra and Dacca in addition to Calcutta as traffic stops on their normal scheduled service between London and Tokyo on the route set out as Route 2 in Schedule "A," Part I, of the Terms of Reference issued to the Air Transport Advisory Council by the Minister of Civil Aviation on 30th July, 1952.

THIS application will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on 30th July, 1952. Any representations or objections with regard to this application must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the application may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [9952

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FREE! Brochure giving details of courses in all branches aero eng., covering A.F.R.Ae.S., A.R.B. Certs., M.C.A. exams, etc. We are the only postal training college operated by an industrial organization. —Write to E.M.I. Institute, Postal Division, Dept. F.26, 43, Grove Park Rd., London W.4. (Associated with H.M.V.) [0926

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SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

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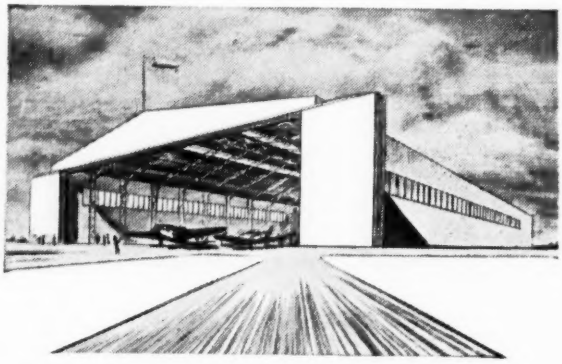

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INDEX TO ADVERTISERS

	Page
Aerocontacts, Ltd.	33
Airscrew Co. and Jicwood, Ltd., The	24
Air Survey Co., Ltd.	32
Airwork, Ltd.	15
Alvis, Ltd.	19
Ashdowns, Ltd.	28
B.B. Chemical Co., Ltd.	24
Bellman Hangars Ltd.	36
Benson, J. J.	35
Blackburn and General Aircraft, Ltd.	Cover i, 1, 32
Bristol Aeroplane Co., Ltd., The	Cover iv
British Emulsifiers, Ltd.	6
British European Airways	14
British Messier, Ltd.	21
Brown Bros. (Aircraft), Ltd.	5
Brown and Co., Ltd., E. G.	6
Central Office of Information (R.N.)	4
Cross Manufacturing (1938), Ltd.	32, 36
De Havilland Aircraft Co., Ltd., The	18
Desoutter Bros. Ltd.	16
Detuners, Ltd.	22
Eagle Aircraft Services, Ltd.	7
English Electric Co., Ltd., The	29
Fairey Aviation Co., Ltd., The	17
Feltham and Son, Ltd., Walter H.	36
Field Aircraft Services, Ltd.	27
Handley Page, Ltd.	13
Henlys, Ltd.	34
High Duty Alloys Ltd.,	20
Iliffe and Sons, Ltd.	30
Lewis, Ltd., D.	32
Leytonstone Jig and Tool Co., Ltd.	31
Lucas (Gas Turbine Equipment), Ltd., Joseph	25
M. L. Aviation Co., Ltd.	32
Mollart Engineering Co., Ltd., The	8
Muir and Adie, Ltd.	36
Oldham and Son, Ltd.	4
Pakistan, The High Commissioner for	36
Palmer Tyre, Ltd., The	Cover ii
Plessey Co. Ltd., The	10
Power Jacks, Ltd.	31
Powis and Sons, Ltd., David	8
Robinson and Co. (Gillingham), Ltd., L.	30
Rotax, Ltd.	11
Rumbold and Co., Ltd., L. A.	9
Sangamo Weston, Ltd.	28
Slingsby Sailplanes, Ltd.	30
Short Brothers and Harland, Ltd.	3
Staravia	35
Sugg and Co., Ltd., William	30
Surrey Concrete, Ltd.	30
Teddington Controls, Ltd.	2
Uhlhorn Brothers, Ltd.	35
Vernons Industries, Ltd.	Cover iii
Vickers-Armstrongs, Ltd.	12
Vinten, Ltd., W.	2
Vulcan Products, Ltd.	31
Wakefield and Co., Ltd., C. C.	23
Western Manufacturing (Reading), Ltd.	9
Westland Aircraft, Ltd.	26
Williamson Manufacturing Co. Ltd.	29
Wolverhampton Aviation, Ltd.	35

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